NRA
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GRAPHIC ARTS INDUSTRY
1934

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY
February, 1935

LOWER GRINDING COSTS

TECHNICOAL
PROCITE TREATED

Technicoal has a grindability rating of 73, reducing grinding costs in most cases 25%. With Technicoal, cement clinkers are uniform and will grind 5 barrels an hour faster *per unit*. Add to this a fuel saving of 11 to 16 pounds per barrel and you have several of many reasons why you should test Technicoal in your own plant.

Send for this complete booklet or arrange for test in your own plant.

- ✓ 1 Less coal per barrel.
- ✓ 2 Lower grinding costs.
- 3 Greater tensile strength.
- 4 Better cement color.
- 5 Uniform operating conditions.
- ✓ 6 Uniform cement clinkers.
- 7 Shortened burning zone.
- 8 Lowered sulphur content.
- 9 Reduced kiln ring formation
- 10 Maximum kiln operation.

POWHATAN COAL
also
Procite Treated

TECHNICOAL SALES CORPORATION
Exclusive Sales Agents
1010 EUCLID AVENUE • CLEVELAND, OHIO
THIS IS NUMBER THREE OF A SERIES OF TECHNICOAL ADVERTISEMENTS

★ Pages 25-27

STOP Costly Abrasion with

Selfvulc

Plastic Rubber Compound

BELOW — Same belt after resurfacing with anti-abrasion plastic rubber compound, doubling its service life at a big saving.

ABOVE—Typical section of worn conveyor belt showing results of abrasion from crushed stone. Such belts are often discarded prematurely and expensive replacements made.

YOUR biggest expense—replacements—can be cut to the bone by protecting your equipment with SELFVULC.

This modern repair material is saving thousands of dollars annually by checking the ravages of abrasion in all types of industrial plants. Here is a typical application:

"During the past three years that we have been using Selfvulc for repairing and resurfacing our conveyor belts, we have not had to purchase any new belts. Our expense for replacements averaged about $7,000.00 per year but since using your material it has shown a saving of 60 to 75 per cent annually."

MOULDING-BROWNELL CORPORATION,
165 West Wacker Drive, Chicago

Worn conveyor belts resurfaced with SELFVULC will last as long as the original belts, or longer. This plastic rubber coating preserves the fabric and provides a new wearing surface of amazing toughness and flexibility. It can be applied by your own workmen without removing the belt from the pulleys.

Equipment for handling abrasive materials—chutes, hoppers, agitators, classifiers, tube mills and dredge pumps—can be lined with SELFVULC to protect the metal surfaces from wear, doubling their durability. Repeated tests prove that plastic rubber will outwear manganese steel plates.

SELFVULC is "first aid" against *wear and tear*, and no storeroom should be without it. You can put it to the test in your own plant by sending for the TRIAL OUTFIT as described below.

Write for discounts in larger quantities

MAIL THE COUPON WITH YOUR ORDER

SELF-VULCANIZING RUBBER CO., INC.
605 West Washington Blvd., Chicago, Ill.

☐ Please send me your **SELFVULC** Bulletin.

☐ Enclosed is my order for a **TRIAL OUTFIT,** including a 25-pound can of **SELFVULC** with cleaning fluid, primer, tools and instructions for applying.

NAME .....

ADDRESS .....

CITY ..... STATE .....

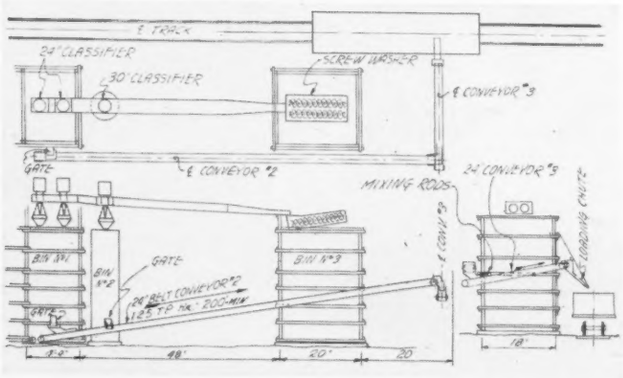
LINK-BELT CLASSIFIERS

for Clean, Accurately Graded Sand

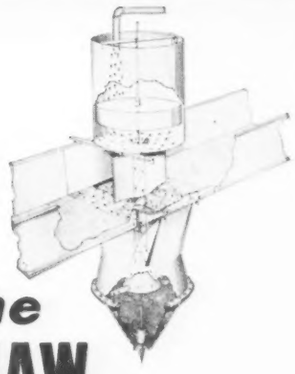
No matter how exacting or varied your sand preparation requirements may be, Link-Belt has the experience and the equipment to meet them. We are in a position to offer 4 types of settling and dewatering devices, to meet the varying conditions in different pits, and to give the required grading, cleansing or dewatering to meet local specifications. Send for Book No. 1240.

LINK-BELT COMPANY

Chicago Philadelphia Atlanta Indianapolis San Francisco Toronto



Modernized sand classification facilities for Northern Gravel Co., Muscatine, Ia. Three Shaw classifiers, and screw conveyor unit.



The SHAW *Classifier*

Cleans and classifies sand automatically to meet the most exacting specifications. It is the most accurate of all devices, giving a controlled grading which can be varied to suit requirements. Dirty water is entirely prevented from getting into the product. Let us send you further information.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis
Atlanta San Francisco Toronto

Automatic Conical

SAND SEPARATOR

A practical, low cost, thoroughly reliable unit. Many of these separators have been in satisfactory operation for eighteen years or more, in plants throughout the country. This less expensive device meets satisfactorily all the requirements in the degree of separation called for by many local specifications.

LINK-BELT COMPANY

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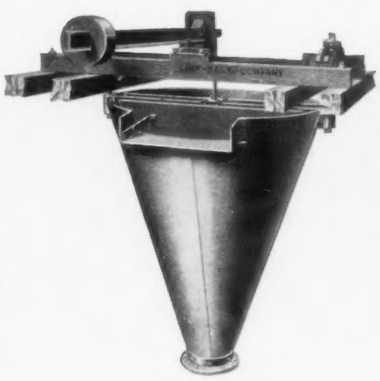


SCREW AND FLIGHT CONVEYOR UNITS

Produce a Drier Sand

The Link-Belt screw conveyor type for small and medium capacities. A most serviceable and practical unit. Produces a clean and dry sand for use where specifications and inspection are rigid. By using two units in series, the coarser sands can be reclaimed for concrete and the fine for plaster.

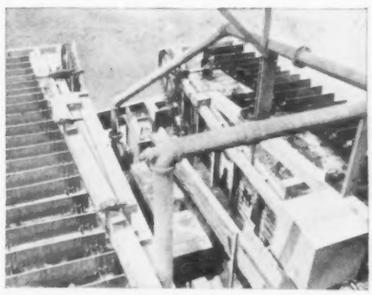
The Link-Belt dewatering flight conveyor gives equivalent results to the screw conveyor unit, and furnishes larger capacities.

By using a fine-sand launder, or by arranging two conveyors in series, a coarse and fine sand can be produced.

LINK-BELT COMPANY 5119-A

Chicago Philadelphia Atlanta Indianapolis San Francisco Toronto

Typical Link-Belt double screw conveyor sand dewatering unit.



Two Link-Belt dewatering flight conveyors at Cooley Gravel Co. plant, near Chillicothe, Mo.

MAY 25 1935
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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 27 | February, 1935 | Number 8

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1897.
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NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

CALL THIS MAN

He is the Goodyear Truck Tire Man.

He'll save you money. He knows truck tires. Behind him are years of experience in the design and application of truck tires for every type of business—on every job.

He represents the most complete line of truck tires made—tires for all kinds of work, for all types of trucks. From that line he can pick the tire for your trucks that will do your job better—will give you better service, longer service, more economical service.

Call him in. Ask your Goodyear dealer to send him over. His services cost you nothing. They save you much.

For trucks that haul sand, gravel, cement, crushed stone, and other materials used in building and construction work, Goodyear builds the Dump Truck All-Weather tire (illustrated here). It has that famous All-Weather tread, a Supertwist cord body of special chemically-toughened rubber and an extension of the tread down the side walls for better traction in ruts — for protection against side wall cuts and bruises.

However, your special hauling conditions — your loads, your roads, the distances your trucks travel, the speeds they go —may dictate either the Goodyear full All-Weather tread tire or the Goodyear Pneumatic Lug tire for best results. That's where the Goodyear Truck Tire Man can help you. He'll analyze your jobs. He'll pick the right tires. And those tires will be MONEY SAVERS.

THE GOODYEAR TIRE & RUBBER COMPANY, INC.
AKRON, OHIO

GOODYEAR TRUCK TIRES

MONEY SAVERS

FULL RANGE OF CRUSHING—SCREENING—WASHING PLANTS

ADAPTABLE TO ALL NEEDS

FIXED COMMERCIAL PLANTS—BRANCH PLANTS—TEMPORARY PLANTS IN SPECIAL LOCATIONS

AUSTIN-WESTERN engineers can quickly adapt to your particular situation one of the many standardized but thoroughly flexible plant designs built by this company.

When you buy a crushing, washing, or crushing and washing plant built completely by Austin-Western, you get the most practical equipment. For these reasons:

(1) The engineers of this company have long been leaders in the field. (2) Austin-Western engineers have very superior units with which to build crushing and washing plants—the three crushers below, for example, and Austin-Western conveyors, elevators, storage bins, power plants. (3) You are dealing with one company and buying from one source.

OVER 30 CRUSHING AND SCREENING PLANTS

The Austin-Western line includes many sizes and styles of crushing and screening plants, ranging from the smallest unit to the magnificent, all anti-friction bearing No. 100 Plant, with its primary and secondary crushers. Space does not permit listing these plants here; their capacities depend on the crushing units used. The two general types of portable and stationary plants are shown on the opposite page.

PORTABLE WASHING PLANT

For many years, the Austin-Western Washing Plant has solved a big problem for many users of washed aggregate by making possible the utilization of roadside material and thus saving transportation costs. This washing plant, used either alone or in conjunction with crushing and screening plants, has a capacity of 1,000 yards of finished product per day. It is low in first cost and exceedingly economical to operate. Actually, it is a revelation to those who have never expected that such capacity could be obtained from a 100% portable plant.

AUSTIN-WESTERN PRIMARY BREAKERS (Jaw-Type Crushers)

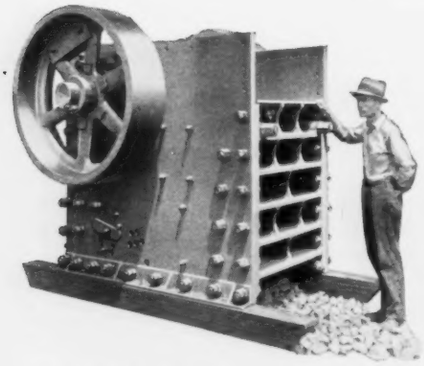
The Austin-Western jaw-type crushers are made in five sizes, all of which are similar to or identical with the No. 1838 Primary Breaker illustrated below.

No. 920 Austin-Western	9" x 20" opening
No. 1220 Austin-Western	12" x 20" opening
No. 1520 Austin-Western	15" x 20" opening
No. 440 Austin-Western	4" x 40" opening
No. 940 Austin-Western	9" x 40" opening
No. 1838 Austin-Western Primary Breaker	18" x 38" opening

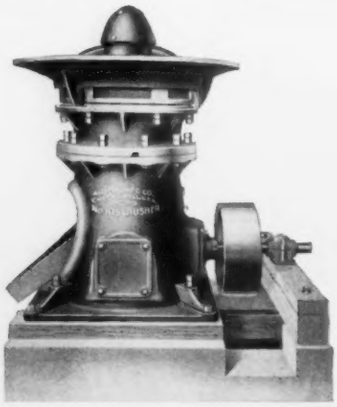
Large capacity, low operating costs and the ability to operate continuously under full load are features of these crushers. They are particularly high-speed—240 R. P. M. for No. 1838, 400 R. P. M. for the No. 440, etc.

Four highest-grade, SKF self-aligning roller bearings are used in each machine; with these bearings and an oversize shaft all trouble is eliminated. Also, to strengthen the shaft: the pitman and main bearings are closer together than in any other machine. Use of roller bearings results in a 60% power saving in starting and 10% saving in operating. Saves lubricant, too—uses 1 quart a day!

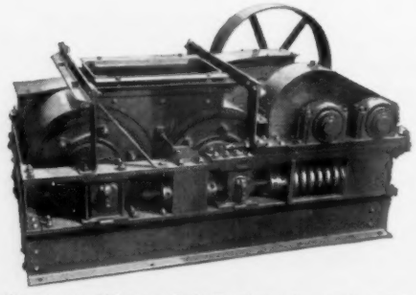
The use of steel plate for frames and toggles, of manganese steel for stationary dies, moving dies and cheek plates, and of chrome nickel steel for bolts are all features of fine frame construction.



The Austin-Western Primary Breaker No. 1838. This jaw-type crusher gives you large capacity at low cost per yard. With roller bearings, it operates at full capacity without bearing or shaft trouble.



The Austin-Western "100-Type" Gyratory Crusher. Recommended where a cubical product is desired. Available in 7 sizes, ranging from 5 to 200 tons per hour capacity. A thoroughly modern, all-feature machine.



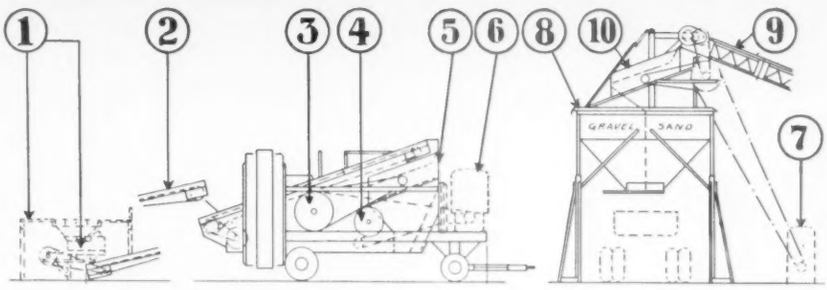
The Austin-Western Roll Crusher No. 3018. Available in one size, using 50 gasoline horsepower. Roller diameters (with shell) 30 inches, face 18 inches. Roll speed 60 R. P. M.

- EXPERTLY ENGINEERED
- LARGE CAPACITY RANGE
- PRACTICAL DESIGN THROUGH LONG EXPERIENCE

Typical Austin-Western Portable Crushing and Screening Plant. Plant is fed with an Austin-Western Primary Crusher.

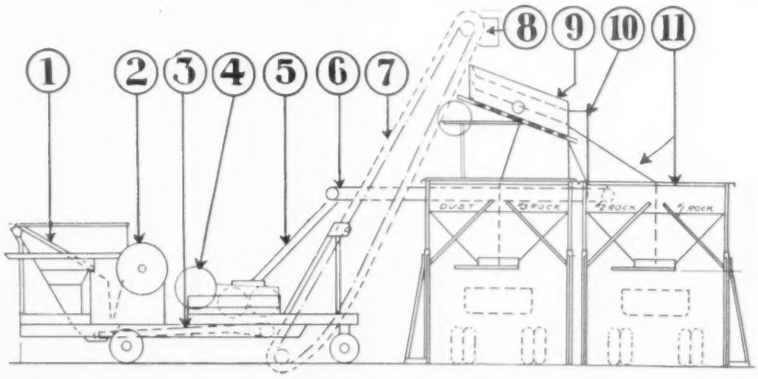
Portable Crushing Plant (No. 100)

(1) Mechanical feeder and loading trap (optional). (2) 30'-24" roller bearing conveyor from mechanical feeder to crusher. (3) 9 x 40 crusher. (4) Reduction crusher. (5) Gyrating screen, 2½ deck. (6) Motor, with belt, (optional). (7) Motor for driving conveyor to screen and screen itself (optional). (8) 15-yd. steel bin, two compartments. (9) 57'-24" roller bearing lattic conveyor—need not operate at right angles to crusher. (10) Single deck gyrating screen. Length of crusher unit, including conveyor, approximately 56 feet; width of plant, approximately 70 feet.



Quarry Crushing Plant (No. 61D2B)

(1) 3' x 7' grizzly. (2) 18 x 38 crusher. (3) Crusher conveyor. (4) Reduction crusher. (5) Spout from oversize conveyor back to crusher. (6) Oversize conveyor. (7) 30' folding elevator from crusher to screen. (8) Elevator hood. (9) Triple deck gyrating screen, lower deck divider. (10) Spout from screen to conveyor. (11) Two 15-yard, 2-compartment steel bins. Overall length of plant is approximately 60 feet; overall height approximately 28 feet.



THE AUSTIN-WESTERN "100-TYPE" GYRATORY CRUSHER

The superiority of the gyratory type of crusher for producing a cubical, uniform product with a minimum of power and expense has long been recognized. These advantages are obtainable to the fullest degree in Austin-Western "100-Type." It is available in 7 sizes, ranging from 5 to 200 tons per hour. The four smaller sizes are portable.

This is the only gyratory crusher that has a bearing on both sides of the driving pinion; the only crusher that receives the same size rock after the head has been adjusted up to the limit; and the only crusher that is thoroughly protected from dust and dirt by two solid, dustproof diaphragms above the oil chamber.

Also important are: a heavy main frame casting with large eccentric drive-end bearings cast integral; an exceptionally large main shaft; pumpless, splash feed lubrication; manganese steel heads and concaves. It is virtually impossible to place any limit on the life of an Austin-Western "100-Type" Crusher, for all wearing parts are easily replaceable.

THE AUSTIN-WESTERN ROLL CRUSHER No. 3018

The Austin-Western Roll Crusher supplements the Austin-Western Jaw and the Austin-Western Gyratory Crushers as an additional unit for fine reduction crushing. Capacities depend on fineness of product, ranging from 22 to 28 cu. yds. per hr., ½ inch or finer to 55 to 70 cu. yds. per hr., 1½ inch or finer.

Many unusual features are found in this machine. Outstanding from a structural standpoint is the location of SKF self-adjusting roller bearings. The shaft is stationary with the bearings *inside the rolls* close to the outer shaft supports, materially reducing shaft load. Other points are: 2-inch manganese steel shells; a provision for changing shells easily; roller chain drive for rolls; and a countershaft for direct motor drive. Heavy springs take the full load of crushing. Rolls are 30-inch.

The Austin-Western Road Machinery Co.

Home Office: Aurora, Ill.
Cable Address: AWCO, Aurora
Branches in Principal Cities

Austin-Western

ROAD ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, SWEEPERS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS, MOTOR GRADERS, DRAGS, SHOVELS, TOURNAPULLS, DISTRIBUTORS WAGONS, SNOW PLOWS.

The Austin-Western Road Machinery Co.
A-7, Aurora, Illinois.
Please send information on the.....
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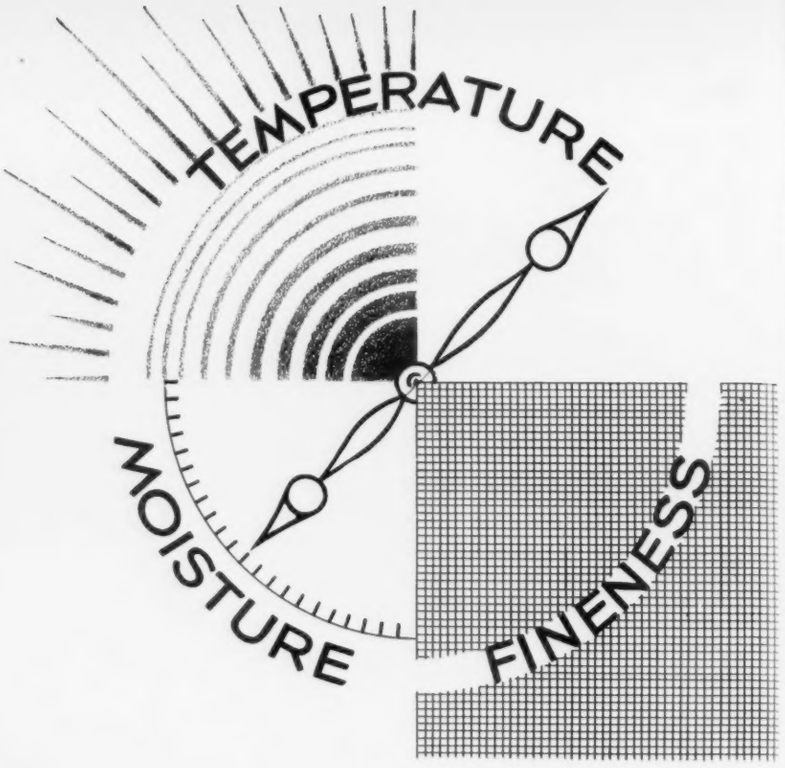
THREE POINT CONTROL



GOVERNING the quality of your product—now more important than ever because of today's exacting specifications—is easily accomplished with the Raymond Roller Kiln Mill.

FINENESS is regulated by the new whizzer air separator—an outstanding improvement in pulverizing equipment—which gives any desired degree of classification from coarse grind up to 99% through 325-mesh or better, a most efficient method of pulverizing various rock products, in custom grinding plants.

DRYNESS of the finished product is determined by the air-drying system which evaporates the moisture to any required percentage during the pulverizing process, eliminating separate dryers and assuring a fine, dry, free-flowing material. This is the modern method of calcining gypsum and performing many other "drying-in-the-mill" operations.

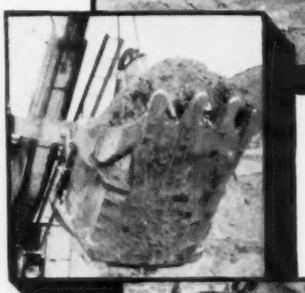
TEMPERATURE control is important in many processes, where the product is sensitive to extreme heat. Delicate materials can be handled in the Kiln Mill without danger of discoloring or "burning" as the controlled heat supply is held uniform, and overheating is prevented because of the moisture always present in the system.

RAYMOND Roller Mills include many advanced features that insure highly profitable production. Tell us your requirements in pulverizing, drying, separating and dust collecting. Our 47 years' experience are at your service.

ORIGINATORS OF AIR SEPARATION
PIONEERS OF PULVERIZING
SINCE 1887

RAYMOND BROS. IMPACT PULVERIZER CO.

Division of Combustion Engineering Company, Inc.
Main Office and Works: 1321 North Branch Street, Chicago
Sales Offices in New York and Los Angeles
Canadian Representative: Combustion Engineering Corporation, Ltd., Montreal



At Grand Coulee Damsite .....

Two Northwest shovels, equipped with two yard AMSCO Renewable Lip Dippers (U. S. Patent No. 1,945,064), were used on an 800,000 yard excavation at the Grand Coulee dam. When the photographs shown above were made this job was a month ahead of schedule due in equal parts to good management, good operation and up-to-date equipment.

In the first 31 days this equipment moved 324,368 cubic yards of material—an average of 10,463 cubic yards for each 21 hour day.

No small credit is due the AMSCO Renewable Lip Dippers for this record performance. The thin cutter edge lip, correct placement of dipper teeth at the lip corners, smooth dipper interior and correct body taper made for faster, easier filling and instantaneous dumping.

Easy renewal of lip (tooth bases are an integral part of lip), all manganese steel (long life) construction and renewable wearing band at the heel are added advantages of AMSCO Renewable Lip Dippers. They are made for all shovels in sizes from 3/4 yard up, and (without renewable lip) in 3/8, 1/2 and 5/8 yard sizes.

Get the facts on this long lasting, fast digging, profit increasing dipper from your shovel manufacturer or our nearest office. Do it now—today!

SIX EXCLUSIVE FEATURES OF AMSCO RENEWABLE LIP DIPPERS!

Tooth bases are cast integral with lip (no expense for renewing bases).

◆

The dovetail joint allows for changing lips quickly and easily merely by loosening two U-bolts and removing four wedges.

◆

The U-bolt fastening between lip and back supplements and reinforces the dovetail joint between lip and front.

◆

Back lugs can be arranged to fit any type of dipper stick. Dippers are made either with or without bail.

◆

A renewable manganese steel wearing band compensates for wear at the dipper heel.

◆

Furnished with double wall lip and teeth for hard digging and rock handling; single wall cutter type lip and teeth for rehandling, stock piling and loose material digging; and a thin, serrated edge, cutter type lip for mucking and clay digging.

AMSCO

TRADE MARK REGISTERED

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

Because YOU CAN'T STOP VIBRATION HERE

Know your Ropes ...This is a helpful hint, how to make wire rope last longer. Subsequent Wickwire Spencer advertisements in this publication will give other dollar saving information. Tell us about your rope problem and we will give you the answer.

Rapid hoisting always sets up severe vibration in the rope directly above the point of load attachment. There is no known way to prevent it. Although visual examination of the rope at this point may not disclose broken wires, the strength of the section from 5 to 20 feet above the load attachment is bound to be greatly reduced because of crystalline fatigue within the wires. It is therefore advisable to cut this damaged section off periodically even though it may still look sound. About ⅓ the estimated life of the rope is a good interval. A breaking test of the discarded piece proves the wisdom of this safeguarding practise.

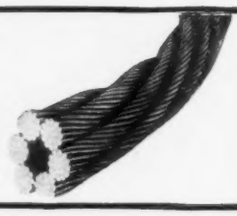
•

WICKWIRE SPENCER STEEL COMPANY, New York City; Buffalo, Chicago, Worcester; *Pacific Coast Headquarters:* San Francisco; *Warehouses:* Portland, Los Angeles and Seattle. *Export Sales Dept.,* New York.

WIRE ROPE *by Wickwire Spencer*

BOTH...STANDARD LAY AND WISSCOLAY PREFORMED.

Wickwire Spencer manufactures all sizes and types of Wire Rope in standard lays and preformed. Wisscolay preformed wire rope will often solve a wire rope application difficulty. Ask our engineers where and when it should be used. Send for a free WIRE ROPE BOOK. It will prove of great value.



ANNOUNCING
... a new 120-B

Owners who knew the 120-B at first hand said it couldn't be done . . . that this famous 4-yard shovel had everything . . . couldn't be improved on. But there was a need in the quarry and mining field for lower costs. Bucyrus-Erie set to work to fill that need with more speed, larger output, greater flexibility . . . retaining all the simplicity and strength of the famous machine that put the railroad shovel out of business. Now this new 120-B is ready to go out on your job . . . completely modernized . . . with a faster cycle . . . even greater power at the dipper teeth . . . improved balance of weight and strength . . . ready convertibility that permits quick and convenient field change to dragline or shovel. Send for complete data on this new 1935 model 120-B.

871

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN
Excavating, drilling and material handling equipment

A WISE investment *if you can use it.* Whether or not you can use it will depend on what value you place on each of these 5 basic advantages.

Less Hazard—very important. Cordeau is an *insensitive* detonator, you know.

More work from your Explosives: You may be able to use less or less expensive powder. Cordeau acts as a direct detonating agent for every cartridge in the hole, so that each has the added force of a primer cartridge. Here's a feature you can estimate in dollars.

Simplified Loading is very important in big shots, and can be quite a factor in little ones. Here's another feature that means a saving in time, labor, money.

Better Fragmentation: Less secondary blasting and less delay for your shovel. This is due in part to the fact that the Cordeau hook-up permits shots planned to release burden, and expend more power in *breaking up* the stone.

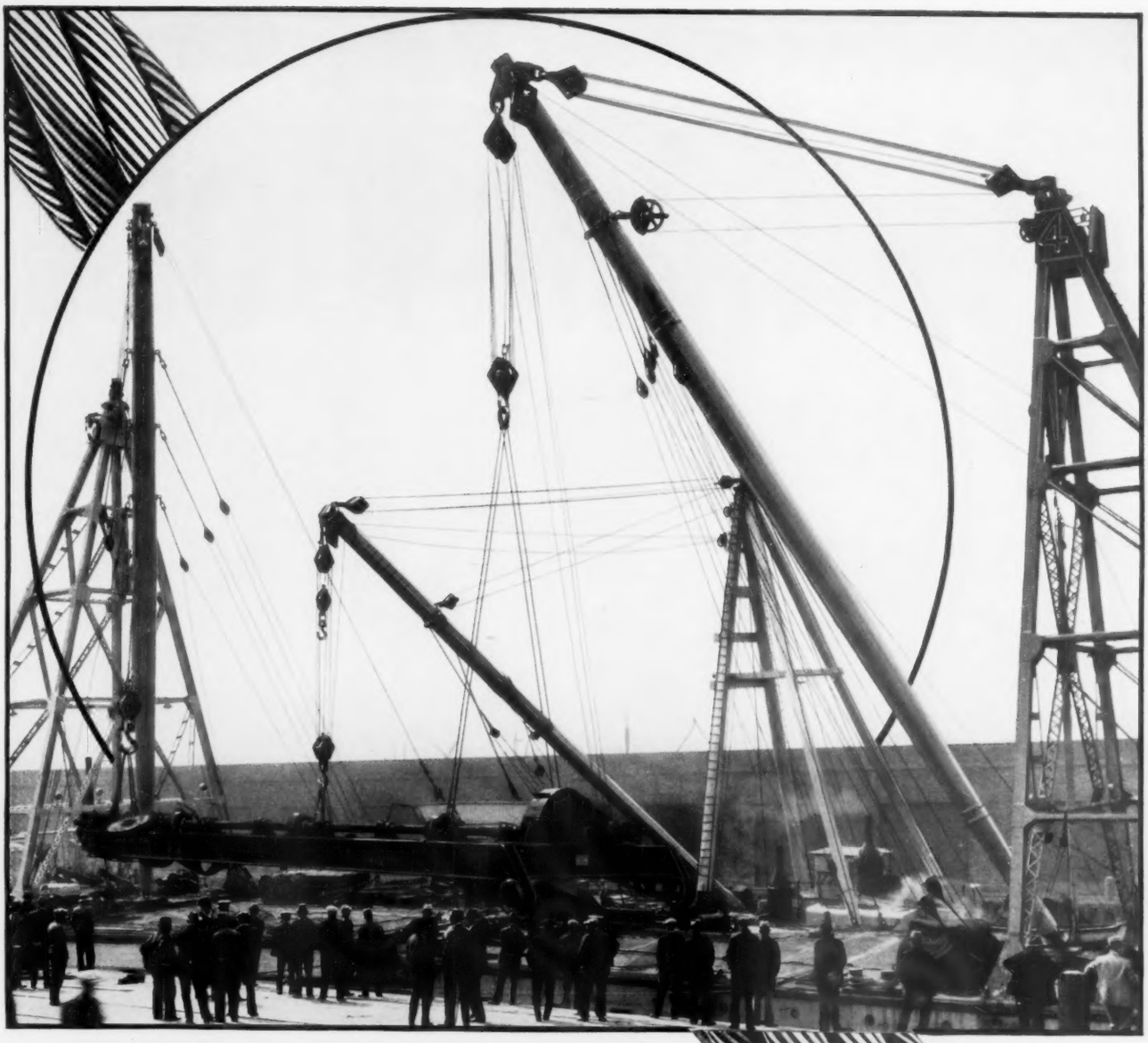
Fewer but Bigger Shots: If you can use giant blasts you'll make some *real* savings because you can keep your equipment in place until all drilling is completed.

Yes—Cordeau pays in *at least* 5 ways. It will pay you—to look into it anyway. Send for the Cordeau book. The Ensign-Bickford Company, Simsbury, Conn. Estab. 1836.

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

CB-39



PROOF

IS ONLY IN ACTUAL SERVICE

It is one thing to talk about the ability of Wire Rope to "take it"—and it is quite another thing to prove exceptional ability by actual performance on the job. In every field of application—wherever the hardest of tasks are to be accomplished—the chances are you will find American Steel & Wire Company Wire Rope doing the work—doing it better—and more economically. This widespread preference is based on proved service records—and on the knowledge that no problem is so large or so small that our engineers will not welcome an opportunity to cooperate.

The TIGER TRADE MARK is a symbol of Strength and Dependability
THE MARK FOR *GENUINE* AMERICAN WIRE ROPE

AMERICAN STEEL & WIRE COMPANY

208 SOUTH LA SALLE STREET • • CHICAGO

Offices in All Principal Cities

United States Steel Corporation Subsidiary

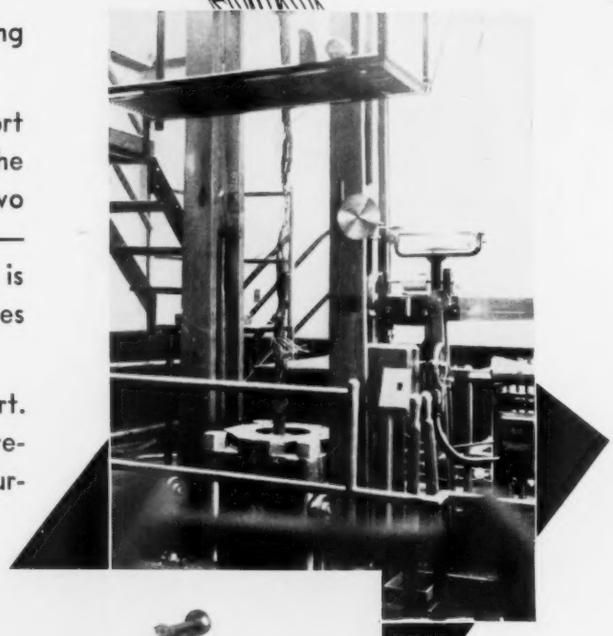
When it's tough going—
—Use

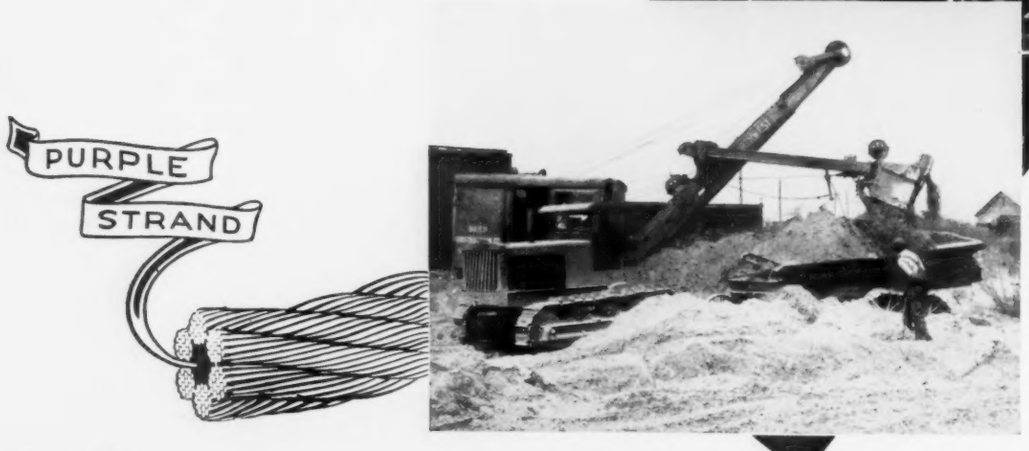
Williamsport

the WIRE ROPE with the reputation for doing a GOOD JOB!

We make sure of the quality of Williamsport Wire Rope by a gruelling series of tests. In the picture at the right you'll see one test by a two story strength tester—a split second photo—in the act of rupturing a 3 inch rope. This is only one of a score of tests made on our ropes you put into service—

Many of which are exclusive with Williamsport. Why not try Williamsport on your next replacement and discover this quality for yourself?

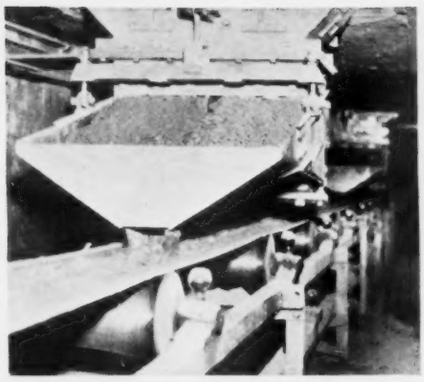


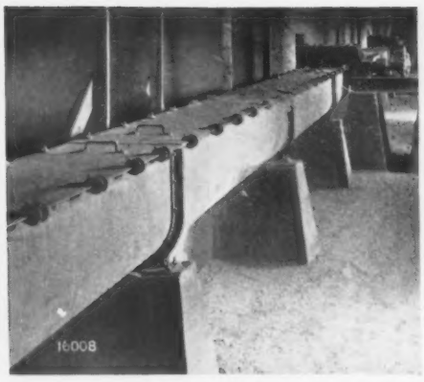


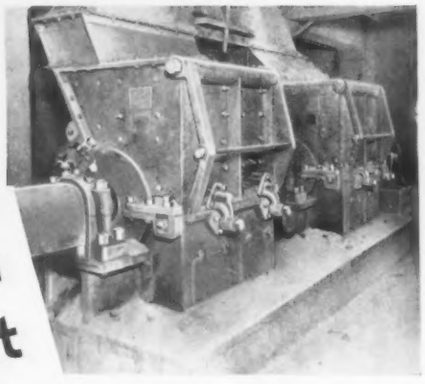
Williamsport
WIRE ROPE COMPANY

Main Office and Works
Williamsport
Penna.

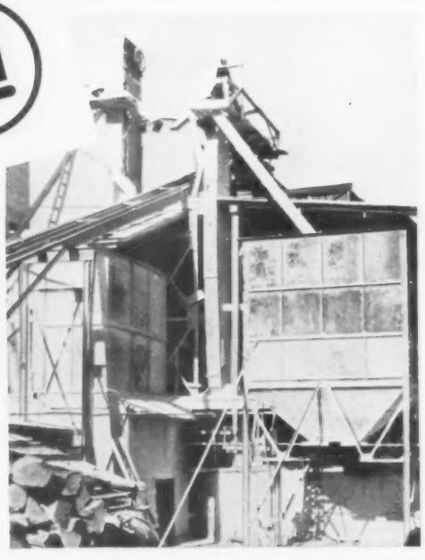
Branch Sales Office
122 So. Michigan Ave.
Chicago







Equipment with a Reputation—to Cut those Costs—It's JEFFREY



If you have a material handling or reduction job of any kind—and want it done quickly and economically—there is a right Jeffrey Unit to do that job correctly without forcing the application of any type.

All kinds of bulk material including: stone, gravel, sand, cement, lime, gypsum and similar products are being elevated, conveyed, screened, washed, or reduced to any desired size . . . by Jeffrey Equipment.

Our Jeffrey Engineers will be glad to solve your handling and reduction problems. And you can rely on recommendations by Jeffrey. Write today.

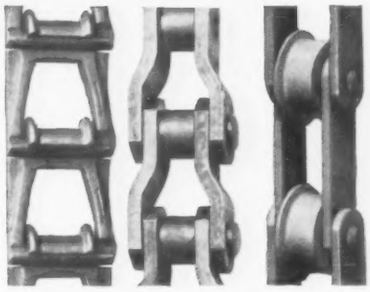
The Jeffrey Manufacturing Company

917-99 North Fourth St. **Columbus, Ohio**

New York	Pittsburgh	Cincinnati	Chicago	Denver	Birmingham
Buffalo	Boston	Detroit	Huntington, W. Va.	Salt Lake City	Dallas
Philadelphia	Scranton, Pa.	Cleveland	Milwaukee		

Jeffrey Manufacturing Company, Ltd., of Canada
Head Office and Works, Montreal
Branch Offices, Toronto—Calgary—Vancouver

JEFFREY



Jeffrey Products:

Elevators and Conveyors
Electric Vibrating Conveyors, Screens, Feeders
Crushers, Pulverizers
Portable Loaders
Sand Settling Tanks
Sand and Gravel Handling Machinery
Washing and Screening Equipment
Coal and Ashes Handling Machinery
Locomotives Chains and Attachments
Sprocket Wheels Gears

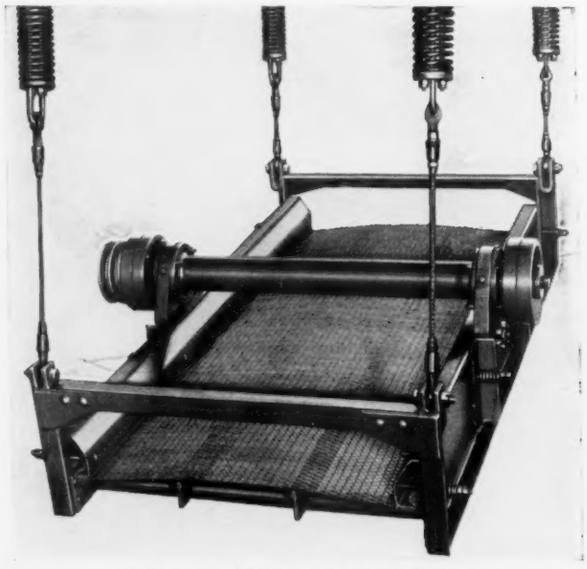
Two Types of Screens

.... *which do you need in your plant?*

ALLIS-CHALMERS vibrating screens are available in two types . . . in sizes suitable for every plant. They are used for sizing crushed stone, slag, ore, sand and gravel, coal and coke, wood chips, commercial fertilizer, in fact, nearly all kinds of materials sized for commercial purposes, either wet or dry.

Aero-Vibe Screens

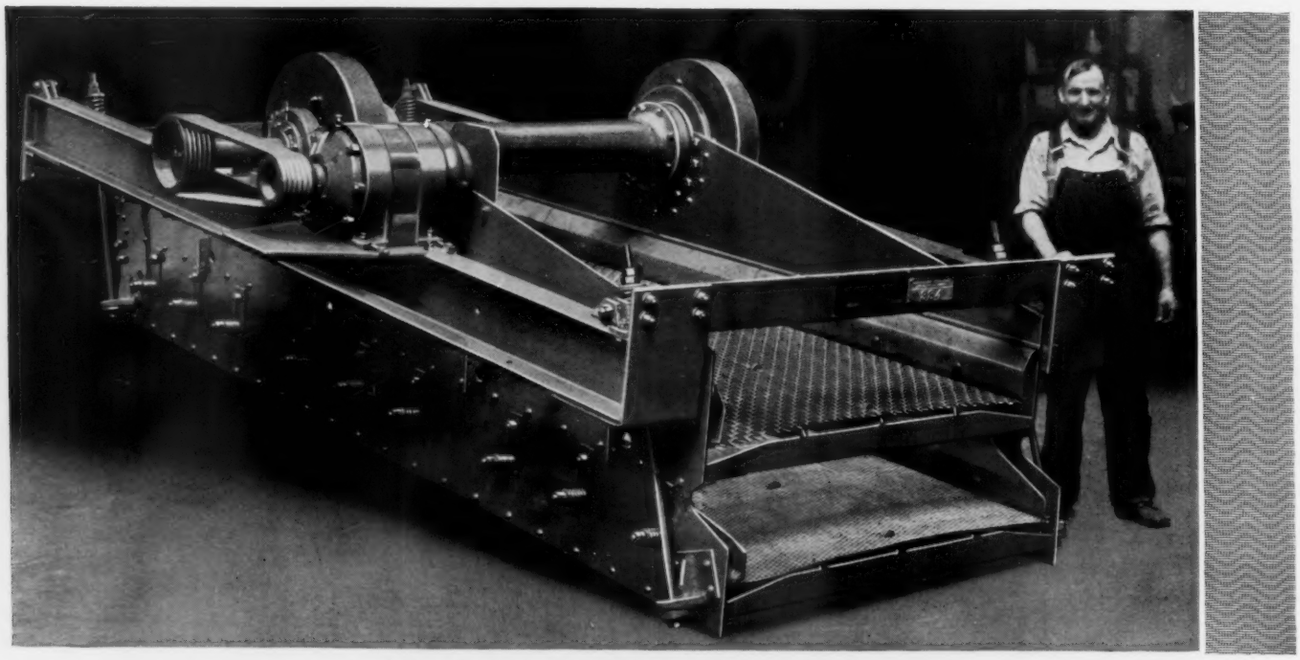
The "Aero-Vibe" screen "floats in the air" suspended from the supporting structure by cables and springs. A rapid, adjustable, vibrating motion is produced by counterweighted wheels mounted on the drive shaft supported in anti-friction bearings above the screen body or vibrating member. Single and double deck "Aero-Vibe" screens are available from 1½ x 3 ft. to 4 x 10 ft. sizes for handling medium to fine size materials, and for limited tonnage.



3′x6′ Single Deck Aero-Vibe Screen

Centrifugal Vibrating Screens

Style "B" Centrifugal screens are built with one, two, or three decks in sizes from 2 x 6 ft. to 5 x 14 ft. and are adaptable for heavy loads and the maximum range of material size. The screening action, which is equally intense for all tonnages, is transmitted to the screen body or vibrating member by an eccentric shaft located above the screen and supported in anti-friction bearings. The screen body "floats" on balance springs reducing power and the load on the bearings; the entire screen is cable and spring suspended.

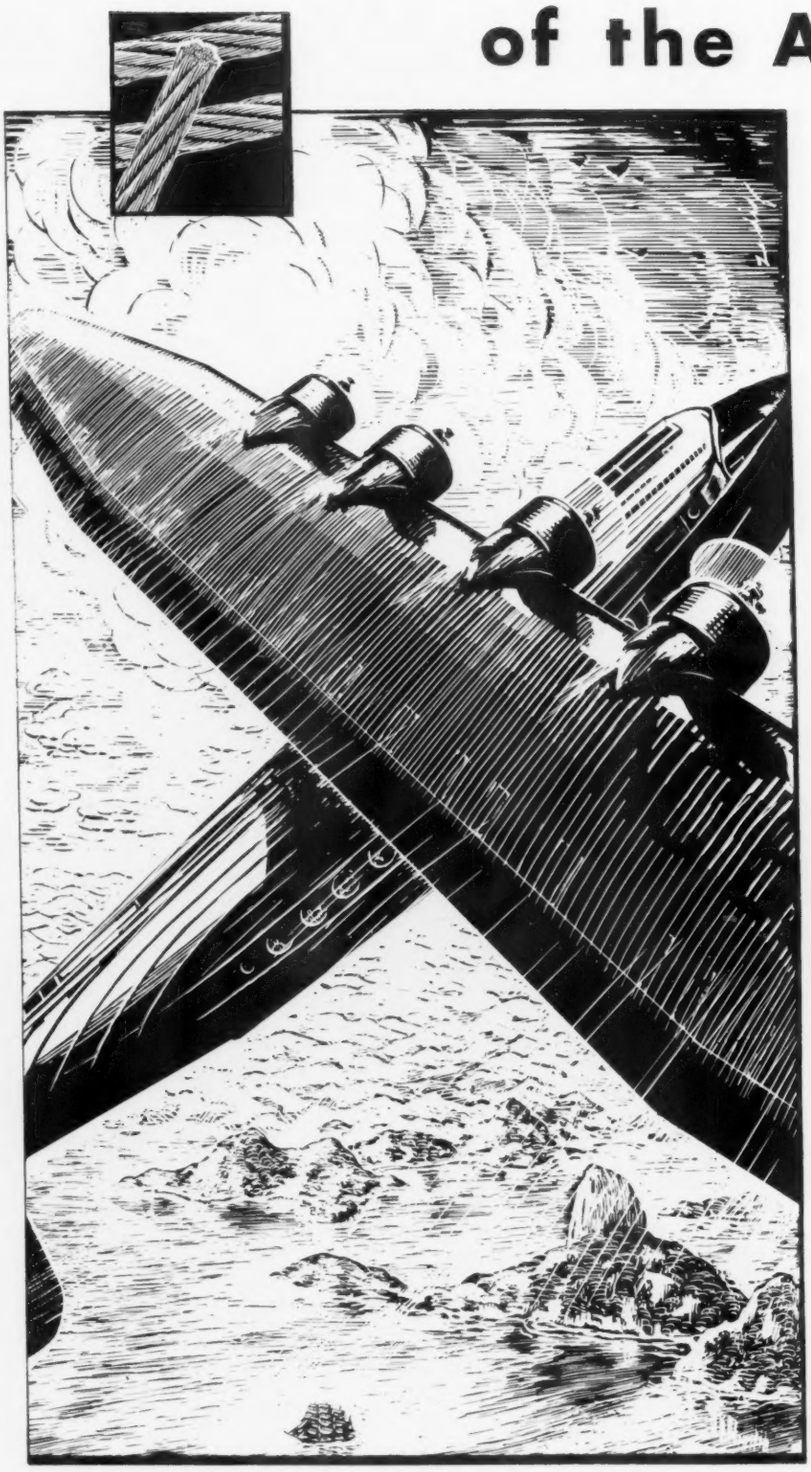


5′x14′ Double Deck Style "B" Centrifugal Vibrating Screen

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

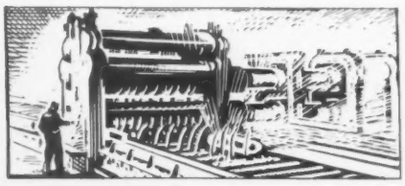
The Clipper King of the Air!



MUST HAVE CONTROL ROPE THAT IS UNFAILINGLY SAFE

Imagine a mammoth flying boat . . . carrying 32 passengers, a crew of six, over a ton of mail and express . . . and capable of flying 1250 miles without refueling. That's the "Brazilian Clipper" . . . holder of all ten world's records for transport seaplanes. It is one of three identical new Pan-American Airways' ships built by Sikorsky . . . the greatest of all trans-Atlantic type planes so far developed.

Designers selected Roebling Wire Rope for controls of all three ships. Almost a half mile of rope per ship.



ROEBLING ROPE STEEL

It is acid open-hearth steel . . . made specifically for wire rope purposes . . . by Roebling's custom methods. Generally acknowledged to be the finest rope steel produced.

Roebling controls every process in making Roebling Wire Rope . . . from steel refining to finished product.

ONE OF THE WORLD'S LARGEST ELECTRIC SHOVELS . . .

an 18 cu. yd. "Marion", operated by Clemens Coal Co. . . . is rigged with Roebling "Blue Center" Wire Rope.

TO MAKE CERTAIN that Roebling Wire Rope will give the user the highest obtainable degree of safe, economical service, Roebling has enlisted the aid of the finest and most complete research, testing and manufacturing facilities. Roebling Equipment for making acid open-hearth steel is an example. John A. Roebling's Sons Company, Trenton, N. J. Branches in Principal Cities.

ROEBLING . . . THE PACEMAKER IN WIRE ROPE DEVELOPMENT

New Handbook–Ready March 1st

For your sales work this year. Many firms throw away old lists entirely and use nothing but the new HANDBOOK list. Thoroughly verified by mail and personal calls, they represent the most complete prospect lists ever compiled—from the points of total company names, plants, individual names (including those who specify equipment) and from detailed lists of equipment in plants. Arranged in two sections—alphabetically by company name, and geographically by location.

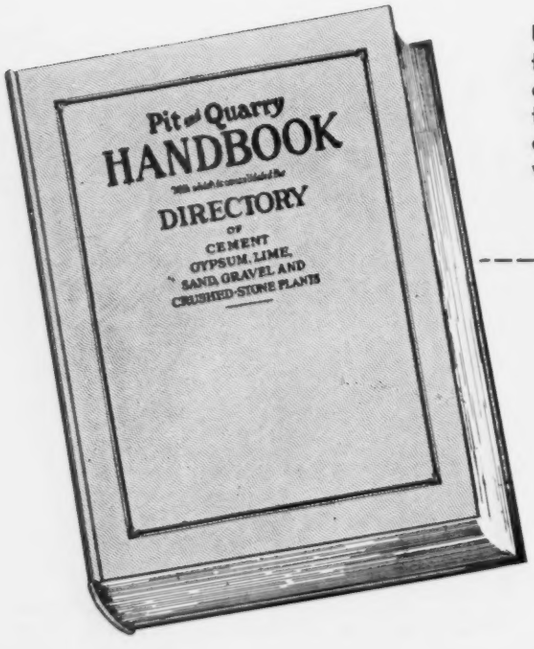
A Complete List of Prospects, Right Up-to-the-minute

Arranged in flow sheet method, according to the flow of the material, it completely covers the nonmetallic-mineral industries from geology to the delivery of the processed materials. All methods and all types of equipment are described. It is used and referred to by producers throughout the world. They call it their "Encyclopedia."

A Technical Section To Keep Informed of Field Progress

The leading manufacturers have placed in the HANDBOOK condensed catalogs of their equipment. This, the producer has found, can be used as a master catalog for other files. Many use it entirely and avoid cumbersome files of odd-sized catalogs.

A Catalog of Catalogs of Leading Manufacturers



Universally used throughout the field. It is completely cross-indexed and so thorough that it forms another reason why producers keep the HANDBOOK within easy reach at all times.

A Buyers Guide For Equipment

ORDER YOUR COPY TODAY

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Pit and Quarry Publications
538 S. Clark Street
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☐ Enter my order for a copy of the 1935 PIT AND QUARRY HANDBOOK, to be sent as soon as published, at a cost of $10.00 per copy.

☐ I enclose $10.00 remittance in full payment.

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WRITE FOR QUANTITY DISCOUNTS

The Hit of the Show

The New

SELECTRO

by

JIGGER

Write for More Details

with

- Vibration Adjustable to Material
- All Moving Parts Running In OIL
- Full Tilting Easy—Even While Running
- True "Circle Throw" Action
- Built-in Safety—No Exposed Moving Parts
- Durable—Extra Heavy Duty Throughout

PRODUCTIVE EQUIPMENT CORP.

210 E. Ohio St. Chicago, Ill.

BIG DRUMS MEAN GREATER CABLE ECONOMY

Are you getting satisfactory service from your dragline cables? To overcome this costly source of trouble LIMA draglines are equipped with machine grooved drums and boom point sheaves of extra large diameters.

With drums thirty times the diameter of cable used, and widths that will accommodate extra long cable length without double wrapping, LIMA users get from five to six times longer service from drag and hoist cables.

If you are in the market for a dragline of ⅓ yard capacity or larger, it will be to your advantage to consider the many savings offered by LIMA.

Bulletins will be sent upon request

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION
LIMA, OHIO, U. S. A.

NEW YORK 67th St. and Sedgwick Avenue | CHICAGO 1543 Straus Bldg. | NEWARK, N.J. 317 Frelinghuysen Avenue | SEATTLE 2344 First Ave. So. | MEMPHIS 77 McCall Street | The General Supply Co. of Canada, Ltd. Ottawa, Ont. | Tyee Machinery Co. Ltd. Vancouver, B. C.

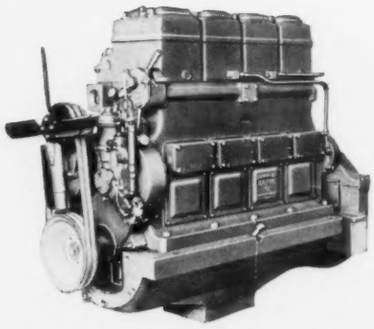
ANOTHER REASON why the cost per yard is LESS with a LIMA

LIMA DRAGLINES are built in ½ YARD CAPACITY and LARGER

LIMA
SHOVELS-DRAGLINES-CRANES

REPLACE costly gasoline power WITH economical, efficient

CUMMINS DIESEL ENGINES



105 H. P. INDUSTRIAL ENGINE

• CUMMINS offers a complete line of Diesel Engines ranging from 35 H. P. to 200 H. P.—for Automotive, Portable Power and Stationary Power Applications. Find out how readily these modern, efficient engines can be installed in your present equipment to replace gasoline engines.

The LINN Diesel-Powered Tractor—standardly equipped with CUMMINS Diesel Engines—moves heavy loads economically and dependably. More than 50 CUMMINS-powered LINN Tractors now in daily service. Ask for performance proofs.

WHEREVER CUMMINS Diesel Engines have replaced gasoline power, they have established remarkable records for power efficiency, fuel economy, operating dependability and low-cost maintenance.

More and more operators in the pit and quarry industries are wisely turning to CUMMINS Diesels to cut costs and speed up work. One operator, using a CUMMINS-powered LINN Tractor for road and bridge projects, reports a saving in fuel cost of approximately 75% over gasoline power for similar work. This is typical of the experience of many users of CUMMINS Diesel Engines.

These modern Diesel engines have the "backbone" for the toughest jobs. Put them to the hardest service on automotive, portable and stationary equipment and they will deliver a standard of performance impossible with gasoline power. They have greater capacity—they move heavier loads—they speed up your operations. They can be relied upon at all times to give dependable, trouble-free performance. And they deliver power at an amazingly low cost!

"IT PAYS TO BE DIESEL-WISE"

Within the past three years, Diesel power has made tremendous strides—and CUMMINS is the leader in Diesel engineering advancement. In the heavy-duty truck field alone, CUMMINS Engines have a record of millions of miles of proved performance. Let us give you complete facts. In writing, please list your present gasoline-powered equipment.

CUMMINS ENGINE COMPANY • COLUMBUS, INDIANA

—The Leader in Diesel Engineering Advancement

SALES AND SERVICE IN PRINCIPAL CITIES THROUGHOUT THE U. S.

BALANCING 9050 LBS. *with* ONE FINGER!

P&H "Sure Feel" Power Clutch

Speeds Dirt Moving Smooths out Punishing Shocks

Admittedly, it's difficult to control 9050 pounds through the clutch with one finger—without touching the foot brake. But these P&H's can do it with a clutch so highly sensitized. The operator "feels" the loads with only 1/10 the effort required by many other types of clutches.

The motor does the heavy work of setting the P&H main clutches. It means faster digging . . . . it prevents motor stalling . . . . avoids strain and cuts repair bills by saving frames, motor and drum shafting and gearing from punishing shocks.

Watch one of these P&H's perform. You'll see what these Split Second Features mean in terms of extra yardage.

HARNISCHFEGER CORPORATION
4451 W. NATIONAL AVE. *Established 1884* MILWAUKEE, WIS.
Warehouses and Service Stations:
Hoboken Memphis Jacksonville Seattle Dallas Los Angeles San Francisco

Auxiliary Clutch Engages Main Clutch

The motor does the heavy work in operating the P&H power clutch, relieving the operator of the tiresome manual labor that reduces his efficiency as the hours wear on. The P&H operator engages a small auxiliary clutch which in turn engages the main clutch. This requires a pull of only 4¼ pounds as contrasted with ten times the physical effort required to operate many other types of clutches.

Highly Sensitized

The balancing of heavy loads in mid-air without touching the brake, demonstrates the manner in which the operator "feels" and handles the heaviest loads with perfect ease. It enables him to run the machine at full capacity all day long without fatigue. Grade line can be held to close limits with maximum ease.

Lowers Maintenance Costs

The shock-absorbing construction of this type of clutch prevents excessive strain and so reduces the cost of maintaining the shovel in continuous service. Consider, for example, the operator who strikes a 10,000 pound rock. Immediately he feels the jolt which would be transmitted to the front end, revolving frame, engine and drum mechanism. In a split second he can release power to ward off what might otherwise develop into a very costly repair bill and service lay-up. By cushioning these jolts, P&H machines are setting unusual records for staying on the job under adverse conditions.

The Sure Feel Power Clutch has but a few moving parts. Its simple design and ready accessibility for lubrication and adjustment keep it at maximum operating efficiency with minimum care.

Also Used on Cranes

Because of its advantage in hoisting steel beams on construction jobs for quick and accurate placement, the Sure Feel Power Clutch is also used on all P&H Split Second Cranes.

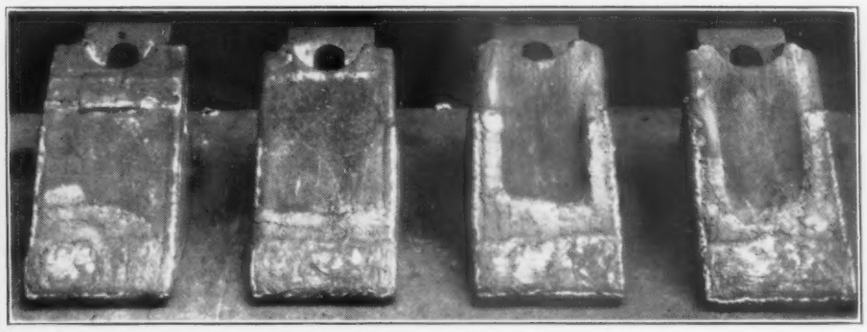
Split Second CONTROL

1. Sure Feel Power Clutches
2. Self Starter
3. Power Dipper Trip
4. Super Smooth Swing Clutches
5. Rapid Reversing Crowd Planetaries
6. Full Vision Cabs

P&H PERFORMANCE SPEEDS UP YOUR PROFIT PACE

INVESTIGATE this New Process!

Dipper teeth rebuilt for $50 which was less than the cost of the original ones, yet they have outworn them 100 per cent.



Worn out pump shell rebuilt and work hardened for approximately half the cost of new ones, yet it gives 25% to 50% longer wear.

Chilled iron crusher head rebuilt with nickel-manganese steel, giving equal service of new manganese head, at far less cost.

Your Old Worn Out Castings Rebuilt with NICKEL-MANGANESE

—will actually last **two or three times** as long as the original steel parts. This vastly increased service life is accomplished by the special McLean process of treating the metal.

First: The rebuilt portion, made of the best nickel-manganese steel, is thoroughly **work hardened** to a maximum before the hard surfacing is applied.

Second: This toughened base metal is then **hard surfaced** with wear-resisting alloy steel, producing a super-tough tool-steel point or surface.

The complete "build-up" is tough clear through. It can take the shock and stress **inside** as well as the wear and tear **outside.** It will not wear, chip off or break under the hardest conditions.

Read This Letter

"Regarding the serviceability experienced on a set of steam shovel dipper teeth, which your shop built up to dimension with nickel manganese and hard surfacing rod, I am advised by the superintendent at our Thornton quarry that these teeth gave us double the yardage commonly experienced with new manganese cast teeth before becoming dull past the point of serviceability."
—Moulding-Brownell Corporation.

Let us quote you on your requirements. We apply hard facing and wear resisting alloys to meet your special repair needs on dipper teeth, pump shells, crusher heads, and other equipment. **Rebuilt work costs less and lasts longer than new parts.**

For those that have their own welding equipment, we are prepared to supply you with a complete line of welding rods and supplies, along with complete instructions as to their use.

Write for Bulletin

which gives details and applications of the McLean process

McLean Welded Products Corporation

530-32 West 79th Street, Chicago, Illinois

Stone Plant on Hudson River with 32 Robins Belt Conveyors, 28 Gyrex and 16 Vibrex Screens.

Stone, Sand and Gravel Plant in New Jersey with Robins Feeders, Conveyors and Screens.

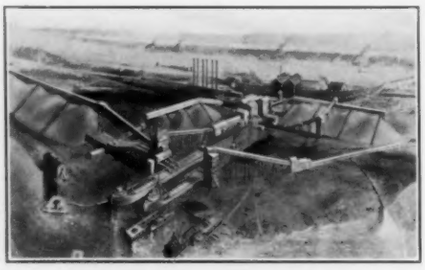
Sand and Gravel Plant in Indiana with half a mile of Robins Belt Conveyors.

ROBINS

That's the name with service fame in handling and screening of material

ROBINS GYREX and VIBREX Screens cover the entire range of light, normal and heavy-duty service—there is a screen that exactly meets your requirements.

ROBINS CONVEYOR IDLERS feature one-shot lubrication, check-valve seals and automatic bearing adjustment. There is a complete range of service and price to meet every requirement.



Limestone Plant on Lake Huron with more than 50 Robins Belt Conveyors.

ROBINS PULLEYS, Bin Gates, Screen Cloth, Standard and **ROBINS-ORO** Heavy-Duty Manganese Feeders, Gears, Pillow Blocks, Take-Ups, Trippers, Belt Training Idlers, Buckets, Portable Conveyors and Rubber Belts for conveyors and elevators, will save you many dollars.

We certainly enjoyed your visits to our booth at the Show in Chicago.

Send for descriptive bulletins and our recommendations.

ROBINS CONVEYING BELT COMPANY

15 Park Row, New York — **37 W. Van Buren St., Chicago**

Boston
Charleston, W. Va.
Cleveland
Detroit

MATERIAL HANDLING ROBINS EQUIPMENT

Representatives in other principal cities

Philadelphia
Pittsburgh
London
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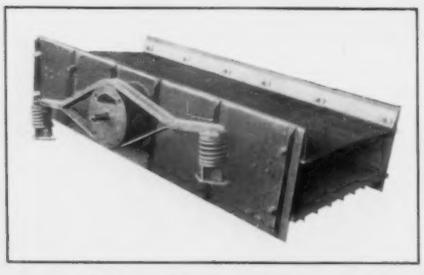
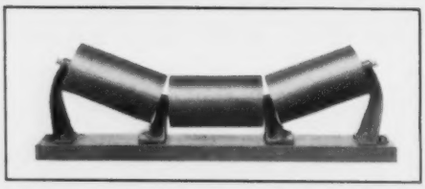
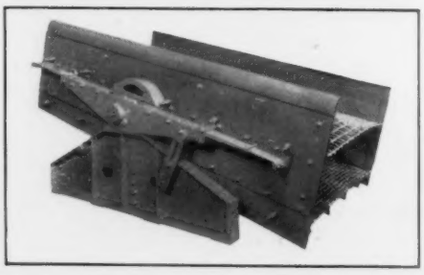


VIBREX SCREEN

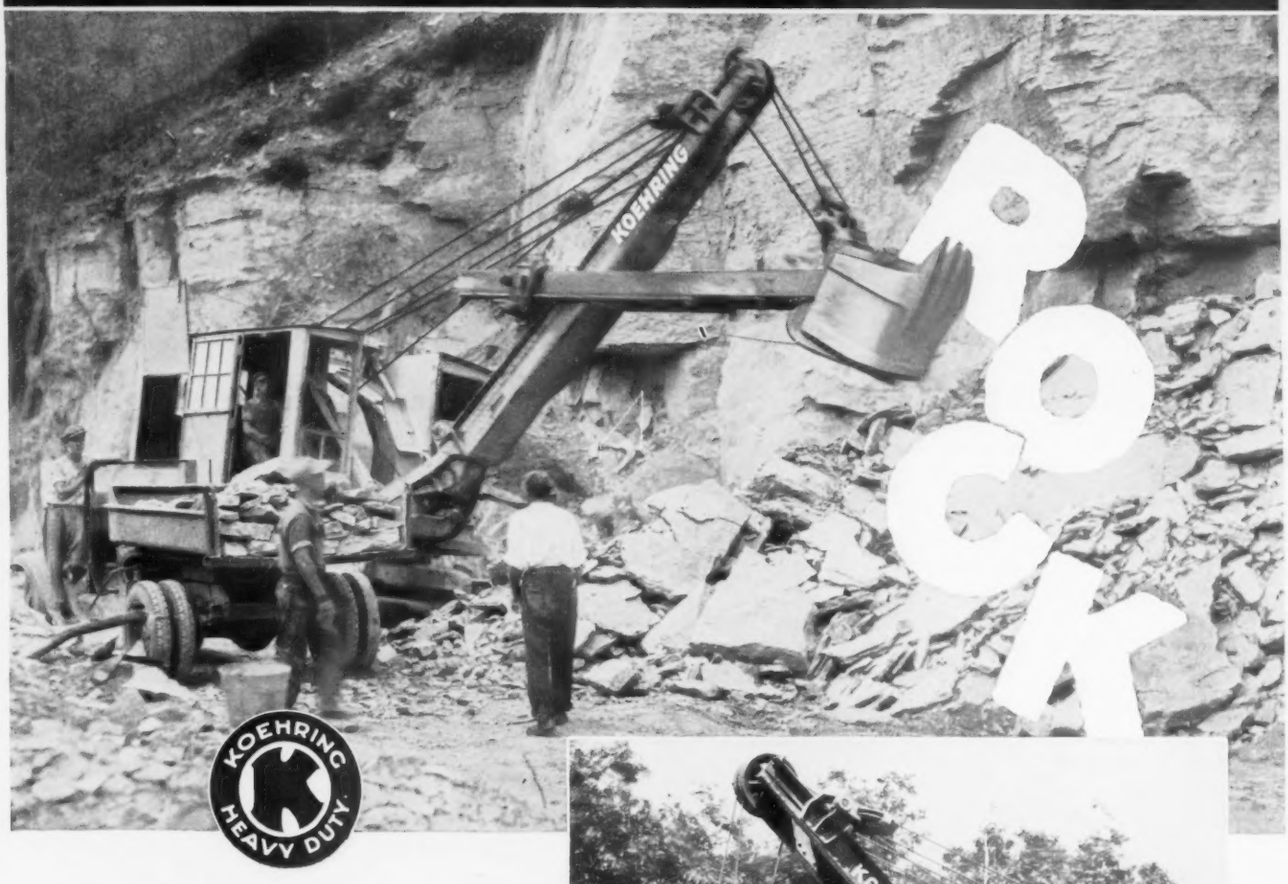


Robins Timken Troughing Idler



GYREX SCREEN

KOEHRING



IN Rock Digging, the KOEHRING SHOVEL easily proves the advantages and value of *Heavy Duty Construction — Boom Shock Absorber.*

Together, they form a bulwark for resisting destructive shocks and strains. Sideswipe shocks, and twisting boom strains are absorbed by the boom shock absorber. A heavy spring at the foot of the boom, cushions the shocks — absorbs the strains — the boom gudgeon revolves in a special gudgeon journal in the boom foot casting.

Reduced wear means minimum delay for repair — resulting in less hours for each job, with increased profits.

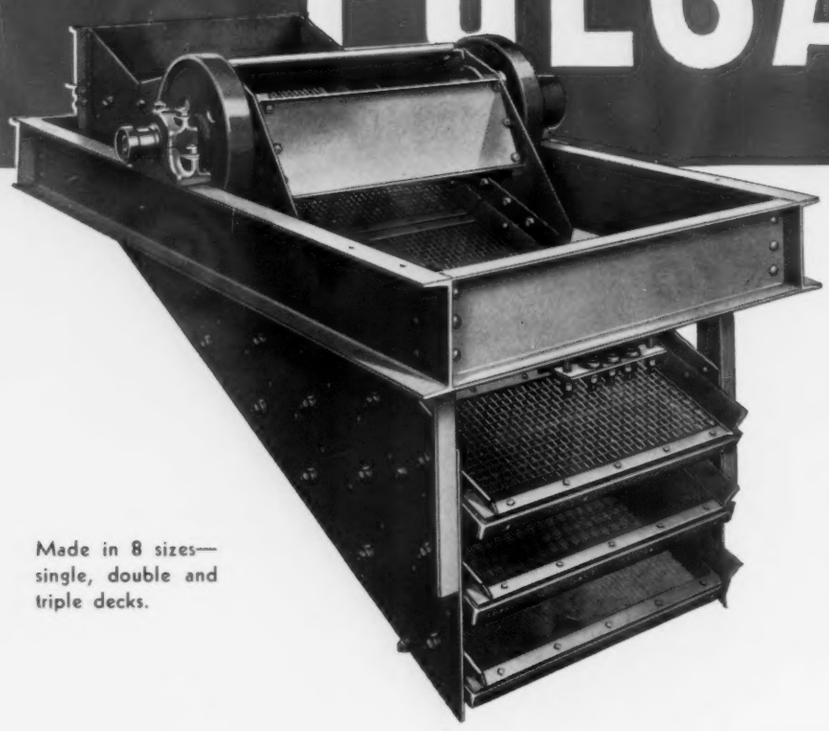
SHOVELS .. CRANES .. DRAGLINES

¾ yd., 1 yd., 1¼ yd., 1½ yd., 1¾ yd., 2 yd.

KOEHRING COMPANY

MILWAUKEE WISCONSIN

THE NEW TELSMITH PULSATOR



Made in 8 sizes—single, double and triple decks.

—A BETTER BUILT HEAVY DUTY VIBRATING SCREEN

Sand, gravel, crushed rock, ore or coal . . . wet or dry . . . the new heavy duty Telsmith Pulsator is designed to screen them all *uniformly.*

The eccentric action of the pulsator produces a circular movement which makes the aggregate literally dance over the wire. The movement produces a maximum screening action, uniform on *every inch of the wire,* on *every deck* and under *any load.*

Unlike other vibrators, the frame is *horizontal,* more compact, rigid and easy to install. The shaft is journalled in a complete, self-contained independent unit . . . mounted on the frame . . . with the screen decks easily unbolted therefrom. The vibrator unit may be readily removed and taken apart in the field so that repairs, when they finally become necessary, may be made with the utmost convenience.

The nested springs are centrally located, to assure uniform support at all points of the deck. These springs carry practically all the load of both decks and aggregate, thereby greatly lengthening the life of the end bearings.

Construction is typically Telsmith—utilizing the toughest alloy steels, the finest anti-friction bearings, special labyrinth and piston ring seals for the protection of working parts. Thus greater value, in the form of longer life and lower upkeep, is built into the Telsmith Pulsator.

Bulletin V-15 gives complete details. It also contains the first table ever published by any manufacturer for figuring the capacities of vibrating screens of any size and any make.

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CHICAGO, FEBRUARY, 1935

Road Builders Hear Problems Discussed

W. P. McDONALD NEW PRESIDENT

Progress that has been made toward the development of a national highway system, in the science and technique of highway design, construction and maintenance, and in the growth of those social and economic values that have accrued to the American people through the development of improved highways and modern transportation, were reflected in the annual convention of the American Road Builders' Assn., held at Washington, D. C., Jan. 22-25.

Federal public-works highway projects to be built during 1935 were of particular interest to the road builders, since this phase of the road-building program will represent the bulk of the work undertaken. Projects so far approved for construction total 25,479 miles and more than half of this mileage, 14,022 miles, is to be of the so-called "low" type of construction, including bituminous mixes and the ordinary sand-clay, gravel and macadam surfaces. As a result, there was keen interest shown in the technical papers regarding bituminous and stabilized roads delivered by C. N. Conner, senior highway design engineer of the U. S. Bureau of Public Roads and other speakers as well as in the modern machines for this type of construction shown at the equipment exhibit.

Recent developments in grading and paving equipment were described in papers read by H. J. Spelman, engineer of the Bureau of Public Roads, E. M. Fleming, manager of the highways bureau, Portland Cement Assn., and B. E. Gray, highway engineer, The Asphalt Institute.

Recommendations for the highway contractors code and opinions on its operation occupied considerable attention. Those who spoke on some phase of this timely subject were E. Sutcliffe, president, National Bituminous Paving Assn., Frederick Hoitt, secretary, New England Road Builders' Assn., E. C. L. Wagner, highway contractor, Jefferson City, Mo., and John E. Ballenger, president of the road building company which bears his name, Lakeland, Fla.

Michigan's experience with the diversion of highway revenues was interestingly told by Murray D. Van Waggoner, highway commissioner of that state. Traffic problems, highway planning, grade-crossing elimination, and development of technique in the construction of street pavements were other subjects dealt with by able speakers.

William P. McDonald, New York, N. Y., prominent road builder and long identified with the highway movement, was elected president, succeeding H. C. Whitehurst, director of highways for the District of Columbia.

Plans to Build Six-Kiln Lime Plant in Tennessee

A six-kiln lime plant, with an estimated capacity of two carloads of chemical lime daily, is to be erected at Knoxville, Tenn., by the Washington Building Lime Co., of Baltimore, Md., according to J. B. Jones, president of the company.

The plant is to utilize marble waste from the quarries of the Gray Knox Marble Co., located on Tennessee River near Knoxville as its raw-material supply and will employ 40 men when production starts later on in the year.

The Washington Building Lime Co. has three plants in service at present, two being located in the Woodville, O., district, the other at Bakerton, W. Va.

Bill Would Allow Cities to Regulate Gravel Pits

Under the provisions of a bill introduced in the New York legislature by Assemblyman H. P. Hermon of Nassau, N. Y., cities, towns and villages within the state would be given the right to prescribe requirements for the operation of sand-and-gravel plants within their corporate limits.

Lehigh Adding Equipment at Metaline Falls, Wash.

Repairs and new equipment are being installed as part of a modernizing program at the Metaline Falls, Wash., plant of the Lehigh Portland Cement Co.

New equipment purchased includes a temperature and moisture control system in the testing laboratory, a new 8-ton gasoline locomotive for quarry-plant service, and six dump cars. A number of other improvements and replacements are also being made under the direction of H. H. Helwig, plant superintendent.

Marquette May Buy Linwood Cement Co.

TO PRODUCE CRUSHED STONE

Purchase of the property of the Linwood Cement Co., located west of Davenport, Ia., by the Marquette Cement Manufacturing Co., is in prospect, according to reports from the Iowa city.

The Linwood property consists of 280 acres of rich limestone located near the Mississippi River, on which a quarry has been opened, a crushing-and-screening plant erected and foundations for a cement plant built. The Linnwood company has been in receivership for some time and has not been operating. It is reported that Marquette's interest in the concern is primarily the development of a first-class commercial aggregates plant, shipment to be made to river ports in the company's barges. The property could also form the nucleus for a new cement plant, the deposits being of the right content for cement raw materials.

Cement Plant Will Again Use Coal to Fire Kilns

After changing from pulverized coal to natural gas for firing its kilns some years ago, the St. Louis, Mo., plant of the Alpha Portland Cement Co., is reported to be preparing to return to coal.

Approximately $75,000 will be expended in making the change, it is said, the improvements including drying and pulverizing equipment and storage bunkers.

The Southern Illinois Reciprocal Trade Assn., which has been active in promoting the use of Illinois coal only for products purchased by the state, claims to have been largely instrumental in influencing the company in deciding to make the change.

Michigan Cement Plant Brings $80,000 as Junk

The state of Michigan, which decided to dismantle its state-owned plant at Chelsea, Mich., and dispose of the equipment itself, after rejecting a high bid of $41,000, will receive approximately $80,000 from salvaging the plant, according to a report recently submitted to the state administrative board at Lansing, Mich.

Construction Gained 23 Per Cent in 1934

ACCOUNTED FOR BY PWA WORK

The construction industries in the 37 eastern states ended the year 1934 with a contract total of $1,543,101,300 for all classes of construction according to F. W. Dodge Corporation; this was a gain of about 23 per cent. over the total for 1933, the increase occurring entirely in the sphere of public work. For the final month of 1934 the contract volume was smaller than in either the previous month or in December, 1933; in fact the total of $92,723,700 was lower than for any month since July, 1933. The loss from November, 1934, was 17 per cent. while the decline from December, 1933, amounted to 55 per cent.

The year 1934 showed contract gains over 1933 in each of the ten general classes of construction, except factories and residential building. The decline in factory construction totaled almost 10 per cent. while the loss in residential building was less than ½ of 1 per cent. An increase of more than 50 per cent. was reported in commercial buildings; awards for educational buildings were practically treble those of 1933; hospital and institutional building showed only a slight advance; public buildings increased by about 5 per cent.; religious and memorial buildings gained less than 5 per cent.; social and recreational buildings increased by something more than 50 per cent.; public works of engineering types, increased by about 25 per cent.; while public utility structures shared in the general advance, too, the gain being somewhat more than 20 per cent.

Improvement over 1933 in total contracts was shown in each of the thirteen major districts in the area east of the Rocky Mountains, except Upstate New York. For residential building alone, however, gains between 1933 and 1934 were limited only to the following major areas: Middle Atlantic Territory; Southeastern Territory; Chicago Territory; Southern Michigan Territory; St. Louis Territory, and the New Orleans Territory. For non-residential building types gains between the two years were shown in contracts in each of the thirteen territories with the exception of Texas.

New California Cement Storage Plant Now Open

The Santa Cruz Portland Cement Co., new Long Beach, Cal., storage plant, under construction several months, opened February 10.

The *Santacruzcement* was scheduled to leave the main plant at Davenport, Cal., February 9 for the Long Beach depot, bringing 40,000 barrels of cement to the Long Beach distributing center.

When the cement is pumped from the ship, ventilators and dust-collecting equipment in the plant will prevent dust from filling the air.

The new storage depot adjoins the plant of Graham Brothers who are Southern California distributors for the cement.

To Construct Rock-Wool Plant Near Chicago, Ill.

Orville White, long associated with the General Insulating Co., at its manufacturing plant at Alexandria, Ind., has left that concern and formed the Mineral Insulation Co., of which he is president and general manager, and has announced that plans are now in progress for the erection of a rock-wool plant to be built at Chicago Ridge, Ill., a suburb located southwest of Chicago.

Two cupolas for liquefying the rock to make spinning possible will be erected in the new plant, although provisions for future enlargement will be kept in mind.

W. E. Barker Appointed PCA Regional Engineer

Appointment of W. E. Barker, who has been attached to general headquarters in Chicago, as southeastern regional highway engineer of the Portland Cement Assn., was announced by W. M. Kinney, general manager, at the annual regional meeting of engineers of the association held at Atlanta, Ga., recently.

Mr. Barker will give help to field engineers in the southeastern states, and will aid state officers in planning pavements suitable to traffic needs.

Pennsylvania Lime Plant to Build New Kiln Soon

Approximately $100,000 is to be spent in erecting a new lime kiln at the plant of the American Lime & Stone Co., Bellefonte, Pa.

Officials of the Warner Co., Philadelphia, Pa., owners and operators of the plant, state that the improvement is being made at this time to aid the federal recovery program. They point out that the additional kiln capacity is not greatly needed just at present but they expect the investment to be profitable in future years.

Two Concerns to Share Louisiana Cement Award

Contracts for the purchase of 238,000 bbl. of cement at a cost of about $500,000 for use in part of Louisiana's $10,000,000 road program, have been awarded, it was announced by A. P. Tugwell, chairman of the Louisiana highway commission.

The contract for 133,000 bbl. for south Louisiana work was awarded to the Lone Star Cement Co. of New Orleans and the contract for 105,000 bbl. for north Louisiana construction to the Arkansas Portland Cement Co. of Okay, Ark.

International Cement Co. Plants Yield Profit

1934 RECORD BEST IN FIVE YEARS

Reports already rendered by International Cement Corp. for the first nine months of 1934 show vast improvement over recent preceding periods as to earnings, and suggest that the company may show for the full year a profit in excess of $1 a share. This would be the first profit reported by the company since 1931.

In the nine months, ended September 30, 1934, International Cement reported a net profit of 85 c. a share, as compared with a deficit of 36 c. a share in the corresponding months of 1933. It is believed that profits were obtained in the final quarter of the year, although at a smaller rate than in preceding periods, and that the indicated $1 a share or slightly better is a reasonable expectation according to the *Wall Street Journal*.

In the first nine months of the year the company reported sales 28 per cent. larger than in the comparable period of 1933. The sales gains were narrowed in the September quarter, but were still substantial. Domestic prices for cement improved in the last year, while demands from numerous consuming sources were revived as a result of government effort to stimulate the building construction. As the present housing program gains momentum and general business activity improves it is expected that demand will expand further.

The International Cement Corporation is one of the three leading producers of cement in the United States, and also operates plants in Cuba, Uruguay, Argentina and Brazil. Total annual capacity is around 24,000,000 bbl., of which 75 per cent. is domestic. There are ten plants in this country, strategically located throughout the eastern, southern and middle western states.

The company was organized in 1919 and has expanded steadily from the original capacity of slightly under 3,000,000 bbl. yearly. Through enlargement and improvement of existing facilities and the construction for acquisition of additional plants, the capacity has been increased by approximately 8,000,000 bbl. a year since 1927, more than $22,750,000 being expended in the subsequent five-year period for expansion and general plant improvements.

Since general business recovery got under way some time ago, the company has been able to show a steady, though gradual gain in both sales and earnings. Signaling the extent of recovery a dividend of 25 cents a share was paid December 31, 1934, to holders of record December 11, the first such distribution since the quarterly payment of 50 c. a share was made March 31, 1932.

Reorganization Plan for Bessemer Heard

FINANCIAL SET-UP EXPLAINED

Reorganization plans for the Bessemer Limestone & Cement Co. have been submitted to security holders and a hearing was scheduled in Federal Court at Youngstown, O., Feb. 5.

Under the plan holders of $2,152,400 6½-per cent. sinking-fund bonds will receive for each $1,000 bond and unpaid interest thereon $500 principal amount of a new first-mortgage bond, 10 shares of $50 par preferred stock and 30 shares of common stock, all being securities of a new Ohio company of the same name as the present Delaware corporation.

Note creditors whose claims total $251,684 will receive for each $1,000 of their claims $500 principal amount of new bonds, 10 shares of the new preferred stock and one share of common stock for each $6.32 of interest due and unpaid.

Holders of present Class A shares of the company will receive 1.06 shares of new common stock for each share of Class A stock. Holders of Class B stock will receive one-eighth share of new common for each share of Class B.

R. C. Steese will be chairman of the board of directors of the new corporation, Charles Schmutz will be president and managing executive, and George C. Treat, treasurer.

Kentucky Stone Concern Leases Another Deposit

The Caldwell Stone Co., of Danville, Ky., has leased limestone deposits near Winchester, Ky., and is installing equipment for the production of crushed stone and agricultural limestone, according to press reports.

Quarry Workers Covered by Group Life Insurance

A group life-insurance policy involving a total of $58,500 has recently been acquired by the Tyrone Lime & Stone Co., Tyrone, Pa., for the protection of its 55 workers, each being eligible to coverage in amounts ranging from $1,000 to $2,500, according to rank.

The Prudential Insurance Co. of America issued the policy and it is of the contributory type, the employees themselves paying a part of the premium, remainder of the expense being assumed by the Tyrone company.

New York Plans "Steal" of Huge Highway Fund

By adding another cent to the gasoline tax in New York State, Gov. Lehman hopes to bring revenue from this source in 1935 to $90,000,000. Of this amount, however, the governor expects to divert approximately 75 per cent. to uses other than road work, leaving merely $23,000,000 for road construction and maintenance.

The New York Crushed Stone Assn. is preparing to oppose this proposal vigorously and is appealing to every producer in the state, urging that each member of his working force, his family and friends, write a letter to his Assemblyman and State Senator, registering vehement opposition to such a plan.

Chas. J. Larkin Again Heads Rock Island Co.

Officers of the Rock Island Sand & Gravel Co., Rock Island, Ill., were reelected Jan. 15 as follows:

Charles J. Larkin, president; Robert E. McConochie, vice president; Wm. H. McConochie, treasurer, and Harry J. Larkin, secretary and manager.

Directors include the officers and Leo A. Larkin, Jacob Imhoff and William M. Kinner.

Pennsylvania Producer Adds Vibrating Screen

Screening facilities at the Annandale, Pa., plant of the Pittsburgh Limestone Co., were improved recently by the installation of a Jigger Selectro vibrating screen, according to the Productive Equipment Corp., Chicago, manufacturer of the screens.

Resumes Operation After Being Idle Three Months

The Hannibal, Mo., plant of the Universal Atlas Cement Co., was reopened Feb. 1, after having been closed for a period of three months. Approximately 400 men went back to work.

Aetna Portland Builds Road to Marl Deposits

The Aetna Portland Cement Co. is building a gravel road 24 ft. wide and 1 1/10 mile in length which will allow safe access to valuable deposits of marl near Marl Lake a little west of its plant at Fenton, Mich. The old road had been declared unsafe for use. The Aetna company will be assured of an additional good amount of first-class marl for use in cement manufacturing at its Fenton plant. A large amount of money will be spent on replacement of machinery at its plant, according to Oliver Dibble, general superintendent.

Cement Plant Installs Bin-Recording Devices

★ The Spokane Portland Cement Co., Spokane, Wash., is reported to have installed in its plant devices which automatically record the level of material in bins. These units, known as Bin-Dicators, are made by the Ripley Mfg. Co., Wayne, Mich.

Indicts Two Lawyers in Silicosis Racket

GRAND JURY ACTS IN ST. LOUIS

Charges that silicosis damage suits are taking on the proportions of a "racket" were partly substantiated in St. Louis recently when Attorney Arthur F. C. Blase was indicted by a grand jury on a charge of barratry.

According to the indictment, Attorney Blase is alleged to have "stirred up, moved and incited" one man to file a damage suit charging he had contracted silicosis and attempted to incite three others to file silicosis suits.

Another St. Louis lawyer, R. J. Horsefield, had previously been indicted on a similar charge and is at liberty on bonds awaiting trial.

The silicosis suits filed at the instigation of the two "ambulance-chasing" lawyers were directed against the Pilot Knob Ore Co. or Iron County, Missouri.

Cement Plant in Brazil Installing Precipitators

A Cottrell electrical precipitator installation is being made at the plant of Compania Nacional de Cimento Portland at Guaximdiba, Brazil, S. A., a subsidiary of International Cement Corp. The installation, which will recover dust from the cement kilns at the South American plant, was shipped by its makers, Western Precipitation Co., from Los Angeles, Cal.

Fred A. Harris Acquires Control of Gravel Firm

The Jonesville Gravel Co., Jonesville, Mich., recently changed its name to the Harris-McBurney Co., with Fred R. Harris as the senior member of the concern.

Mr. Harris, who has been sales manager and plant superintendent of the operation for a number of years, acquired the interest in the concern formerly owned by the Brooks Construction Co., of Fort Wayne, Ind.

Wedron Silica Co. Adds New Handling Equipment

★ The Wedron Silica Co. has installed a new bucket-elevator at its Wedron, Ill., plant. The machine was furnished by the Stephens-Adamson Mfg. Co.

Work Starts Feb. 20 on $100,000 River Terminal

Construction is scheduled to begin February 20 on the new $100,000 terminal of the Chicago Gravel Co., five miles south of Joliet, Ill., on the Lakes-to-Gulf waterway. Rock-filled timber construction will be employed with a frontage of 325 ft.

Editorials

The Thirty-Hour Week

THE proposal to establish by legislation a maximum work week of thirty hours in all branches of industry has already aroused much discussion among business men and the general public, and as the day of its enactment into law approaches we may expect to see that discussion developing into bitterness. This is true of all innovations that touch our material interests, and certainly no proposal could affect more materially the interests of employer and employee alike than one to shorten the number of hours during which a worker may be employed.

Despite an accumulation of evidence which demonstrates that the work output of a man is not directly proportional to the number of time units consumed in performing it, employers generally still believe that a 12-hour shift should produce twice the number of output units obtainable from a 6-hour shift. And, having started from that premise, it is but natural that they should also believe that a shortening of the number of working hours by one-half will result in reducing the worker's output by one-half. This fallacy may account for a large share of the misgiving with which industrialists have always viewed the prospect of a shorter work week or work day. A general unwillingness to make any concessions to labor, whether organized or unorganized, may account for most of the rest. What remains in the way of formidable opposition may be attributed to our common reluctance to accommodate ourselves to the new ideas born of changed conditions.

Although much of the discussion which the 30-hour-week proposal has provoked centers on the propriety of adopting thirty hours as the maximum limit, it ought to be evident that the precise number of hours is a matter of slight importance compared to the general principle involved. No one can honestly say, either as a matter of unsupported opinion or on the basis of factual findings, that any definite number of working hours represents the optimum work week in any one industry, to say nothing of industry as a whole. It is impossible, with the limited amount of statistical data available, for anyone to determine the relationship factor between producing ability and consuming ability with even the smallest degree of certainty. That being true, it is idle to attempt to fix upon a given length of work week as something inherently good or bad. Yet those who oppose the 30-hour week, as well as those who advocate it, have apparently been guided principally by their prejudices and have made few if any serious attempts to support their arguments with facts. Even such reports as the recently-published pamphlet of Messrs. Moulton and Leven, issued by the Brookings Institution, are open to the same criticism.

As has been said, the most important aspect of the 30-hour-week proposal is the fact that it seeks to establish a work week considerably shorter than the one now in effect in most industries. There is nothing novel in this, since the length of the work week had been declining steadily in this country as well as in Europe for many years prior to the adoption of recent hours-of-labor legislation in various countries. As Paul H. Douglas has shown in his *Real Wages in the United States, 1890-1926*, the normal weekly working time in the United States prior to the World War had fallen from 58.4 hours in 1890 to 53.8 hours in 1913. Since the World War the average number of hours in the industries covered by the United States Census of Manufacturers declined to 51.1 in 1923. According to data on twenty-five manufacturing industries collected by the National Industrial Conference Board and published in *Wages in the United States, 1924-1929*, the average work week in 1929 consisted of 49.6 hours and of 44.8 hours in the cases of employees having membership in trade unions. Not many years had passed following the close of the war before either the 8-hour day or the 48-hour week had become either legal or customary in the majority of European countries and the standard or normal week in the United States did not exceed 48 hours. Since 1933 many of the industries which have adopted codes under the National Industrial Recovery Act have fixed on 40 hours as the proper maximum.

The downward trend in the number of hours in the work week as shown by this brief review merely continues a shortening process which had been in progress for a long time, and there is every reason for believing that this trend will continue, whether the maximum work week be one of 36, 33 or 30 hours. The exact number of hours may be the result of agreement between employers and employees or of legislation, but present indications are that the matter will not be left to negotiation but will become the subject of legislation. In this case, as in all others relating to social problems, legislation follows rather than precedes advance in social thinking, which, with respect to the hours of labor, has proceeded far more rapidly than legal enactments. Present efforts to fix legal limits even below those set by N.R.A. codes merely indicate an attempt to bring legislation abreast of modern thought and conditions.

Employers will do well to remember that working time is but one factor among the many which condition labor productivity, technological progress being a matter of great importance in determining the rate of work output per man-hour. The increase in this rate which is expected to follow the shortening of the work period does not follow inevitably, immediately or always to the same degree. But there are other grounds for advocating a shorter work week, chief among them being the desirability of establishing a balance between production and consumption. This balance can be

achieved only by increasing consumption, which now lags, and for a long time has lagged, far behind production. A shorter work week, with the resulting increase in leisure time, will result in increased consumption, which is the only sound basis on which increased production can be economically justified and supported.

This advantage of shortening the work period was recognized even in Civil War days, when Ira Stewart said that "men who labor excessively are robbed of all ambition to ask for anything more than will satisfy their bodily necessities." He was arguing for the adoption of an 8-hour day as a means of increasing consumption and production. In its report on *Recent Economic Changes in the United States* the President's Conference on Unemployment said that it has begun to be recognized "not only that leisure is 'consumable,' but that people can not 'consume' leisure without consuming goods and services, and that leisure which results from an increased man-hour productivity helps to create new needs and new and broader markets." Conspicuous among modern employers who have recognized the need for establishing a balance between production and consumption is Henry Ford, who has said that labor must have more leisure in which to consume the products which it produces.

Our ability to produce commodities of all kinds has increased more rapidly than our ability to consume them and the gap between the two will widen unless we retard technological development or stimulate consumption. No one who recognizes the advantages of past technological improvements and can visualize the value of continued advance is likely to advocate the placing of any check on our ability to improve our material condition. The only apparent alternative is to increase consumption, and one of the obvious ways of accomplishing that is the provision of greater leisure in which to consume the products of labor. With the rate of technological advance and mass-production methods increasing rather than decreasing, the demand for labor required in those processes declines. Unless we are to encourage the development of a new "idle" class—a horde of unemployed "employables" living on public charity—we must decrease the work periods of workers somewhat in proportion as their productivity has been increased by technological developments. It is foolish to expect that these developments will in themselves create employment by the provision of new products catering to new needs. As new products are developed, the newest methods of producing them are employed; that is, we do not produce our newly-invented commodities by hand labor, but by the most advanced technological methods available at the time. And as the chief improvement observable in these new methods is their decreasing dependence on human labor, new inventions can not be counted on to absorb the workers discarded by improved production methods.

The era of decreasing work periods has coincided with that of our greatest industrial development, therefore the one can hardly be destructive of the other. In fact, the shortening of the work week and work day may have been an important factor contributing to that industrial development and is, for that reason, something which every industrialist should favor. We do not see why industrialists as a class should oppose a movement which is so well supported by the evidence of our past industrial growth and which promises to be equally useful in furthering that growth.

Criticism From a New Quarter

WE have become accustomed to hearing critics of the present social and economic order talk of the decline and even the collapse of capitalism, and there has been a large number of such critics in the realm of business. It is, however, something in the way of a novelty to see the existing scheme of things questioned by banking economists.

In a recent bulletin on business conditions, published by the National City Bank of New York, we find a new approach to criticism of our present system. It brings out the fact that the government has spent huge sums to increase the purchasing power of the people by its relief work and public-works activities, and that these expenditures are proceeding at the rate of more than $4,000,000,000 a year. This is almost equal to one-sixth of the country's total 1933 retail business, which the census reports as having been $25,750,000,000. Commenting on this, the bulletin says: "It is a significant fact that current business is dependent in such degree upon an arbitrary addition to the purchasing power which arises from the production and exchange of goods within the economic system. It is significant because it shows how far short of supporting itself the economic system still falls."

The observation is certainly a candid one and no one familiar with conditions will deny that it is a sound one. This is the precise charge which every well-informed and sincere critic of our economic organization has made against it. The system gave us goods in plenty, profits in plenty at times, a productive plant in excess of our ability to consume its products, but it did not provide the mass purchasing power on which the permanent growth and support of industry depend. Mass production unaccompanied by mass consumption is an economic load of terrific magnitude, as the experiences of the last few years have taught everyone who has been even only half awake, but business circles, particularly the financial, have been either unaware of the fact, unwilling to admit it, or without opinions regarding possible remedies.

We earnestly hope that business men generally will become conscious of the defects of the present system and contribute according to their ability toward finding ways for correcting them. Unless and until they do we must expect to see these defects aggravated to the point where it may become impossible to remedy them before they have caused permanent and irreparable damage to the economic structure. Long before that time comes it may be extremely difficult for business men to find suitable and comfortable niches for themselves in what may remain of it.

Aggregates Industries Meet to Discuss Status of Code Enforcement

Chairman of the Code Authority, Otho M. Graves.

IN an atmosphere somewhat beclouded by uncertainty concerning their legal status as industry representatives, 59 duly-elected members of the 1935 Code Authority of the crushed-stone, sand-and-gravel and slag industries assembled for their scheduled meeting at the Palmer House, Chicago, on January 28. Just before the meeting the National Recovery Administration's representative had given the warning that, pending official N.R.A. approval of its membership, any action taken by the new body would be ineffective for lack of legal sanction.

What for a time appeared to be a serious difficulty was surmounted by adopting the expedient of holding meetings of the two Code Authorities—the 1934 and 1935 bodies—in the same room, their members sitting in on both meetings but voting only when their respective Code Authority was in session. As the industries' code provides that members of the Code Authority shall serve for one year from its effective date "or until their successors are elected for a like term," it was decided that the 1934 Code Authority should sit and act upon all matters presented for consideration and that the 1935 Code Authority should convene immediately thereafter and consider and confirm the acts of the 1934 body. Aside from the necessity of recessing and reconvening each body as the occasion required, with a resulting shifting of the center of interest and action from one Code Authority to the other, the plan presented no difficulties.

The 1934 Code Authority considered the report of its activities during the year and listened to Otho M. Graves, the Code Authority's chairman, voice his belief that the code provisions designed to prevent increases in the producing capacity of existing plants or the building of new plants through the establishment of "permissive" areas (Art. VII, Sec. 5) can not be legally enforced. Speaking as the head of the Code Authority he had recommended a revision of the Code's definitions of crushed-stone, sand-and-gravel and slag producers, as stated in Art. II, Sec. 5 (a), (b) and (c) so as to free contractor-producers from the discipline imposed by the code.

Anson Blake (Blake Bros. Co., San Francisco, Cal.), speaking on the "permissive" area topic, said

H. J. Love.

J. R. Boyd.

V. P. Ahearn.

that he favored the retention of the capacity-restriction provisions and cited cases to illustrate their effectiveness in California. John Prince (Stewart Sand & Material Co., Kansas City, Mo.) argued for the same point of view, saying that the investment of capital in production capacity that is not need is an economic waste. In one region all but one of some twenty applications, which had been filed asking for permission to build new plants, were withdrawn owing to the coercive effect of the code's provisions, it was pointed out.

Interest in the status of the contractor-producer under the code was increased by the ruling of Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads, in which he held that the contractor-producer, who produces materials for his own use from deposits he may come upon, is subject to the provisions of the general contractors' industry code, a division of the construction industry code (No. 244) known as Supplement 1.

On the proposal to remove contractor-producers from the discipline set up by the aggregates code Anson Blake expressed his opposition, and others took the same position, believing that it would be a serious mistake to approve such action. A Committee on Contractor-Producer Relations was appointed to report to the meeting its recommendations. Its chairman, John Prince, was assisted by Anson Blake, R. C. Fletcher, Frank P. Spratlen, Jr., W. M. Stoner (Western Sand & Gravel Co., Lincoln, Neb.), H. V. Owens (Eastern Rock Products, Inc., Utica, N. Y.), F. D. Coppock (American Aggregates Corp., Greenville, O.), George W. Gauntlett (Pioneer Sand & Gravel Co., Seattle, Wash.) and J. L. Shiely (J. L. Shiely Co., St. Paul, Minn.). The committee's report expressed the opinion that the elimination of the contractor-producer would be destructive and suggested that the Code Authority's Executive Council try to obtain from the N.R.A. the authority to police this section of the industry through regional committees as one of the problems calling for local treatment.

Another question which provoked animated discussion was the proposal to eliminate from the code the provisions of Art. VII, Sec. 2 (d), which set up each producer's "prime plant cost . . ., plus 10 per cent." as the figure below which he must not sell his product. A motion to eliminate this requirement, based on a recommendation of the Code Authority, was not approved. John Prince's motion that the proposal be referred to the Code Authority Executive Council was carried. Approval by the N.R.A. of the industry's proposed cost-accounting system, which was designed by Ernst and Ernst and submitted to the government many months ago, has been withheld, apparently because of a fear of the "basement level" of cost which is provided by the provisions just mentioned.

Anson Blake, as chairman of the Resolutions Committee, offered several resolutions dealing with problems of vital interest to the industries. One resolution opposed the common practice of having government agencies operate aggregates producing plants and another the diversion to non-highway uses of motor-vehicle and gasoline taxes. Of two

LARGE GROUPS IN ATTENDANCE AT AGGREGATES CONVENTIONS AND JOINT EXHIBITION

Producers:

General Crushed Stone Co.	11
Eastern Rock Products Co.	6
Western Indiana Gravel Co.	5

(Four companies had 4 representatives each; 20 had 3 each; 35 had 2 each; and 163 had 1 each.)

Equipment Makers and Publications:

Allis-Chalmers Mfg. Co.	12
Hercules Powder Co.	10
Pit and Quarry	10
Burton Explosives Co.	8
Pettibone-Mulliken Co.	8
Bucyrus-Erie Co.	8
American Manganese Steel Co.	7
Rock Products	7
Du Pont	6
Jaeger Machine Co.	6
American Steel & Wire Co.	6
Productive Equipment Corp.	6
Robins Conveying Belt Co.	5
Kensington Steel Co.	5
Chain Belt Co.	5
Marion Steam Shovel Co.	5
John A. Roeblings' Sons Co.	5
Nordberg Mfg. Co.	5
Sauerman Bros., Inc.	5
Macwhyte Co.	5
Cross Engineering Co.	5

(Four companies had 4 representatives each; 6 had 3 each; 15 had 2 each; and 6 had 1 each.)

ANALYSIS OF ATTENDANCE

	Crushed-Stone	Sand-and-Gravel	Slag	Net Totals
Producing companies' representatives	147	165	19	331
(Companies represented)	(94)	(126)	(15)	(225)
Association employees	5	4	3	11
(Associations represented)	(1)	(1)	(1)	(3)
Equipment-manufacturing companies representatives				190
(Equipment-manufacturing companies represented)				(48)
Trade-publication representatives				19
(Trade publications represented)				(3)
Guests	16	22	..	38
Code-organization employees	6	15	1	22
	173	206	23	611

other important resolutions, one favored the allocation of a substantial part of the government's $4,000,000,000 public-works appropriation to highway building, and the other favored placing such allocation in the hands of the United States Bureau of Public Roads for distribution to state highway departments.

The 1935 Code Authority comprises the following:

(1) Members Chosen in Industries and Regions

Region 1—(Crushed-Stone): A. L. Worthen, New Haven, Conn. (Sand-and-Gravel): Paul P. Bird, Boston, Mass.

Region 2—(Crushed-Stone): Otho M. Graves, Chairman, Easton, Pa. (Sand-and Gravel): Anderson Dana, New York, N. Y. (Slag): Harris N. Synder, Buffalo, N. Y.

Region 3—(Crushed-Stone): A. W. Worthington, Pittsburgh, Pa. (Sand-and-Gravel): Alexander Foster, Jr., Philadelphia, Pa. (Slag): George J. Frye, Philadelphia, Pa.

Region 4—(Crushed-stone): L. J. Boxley, Roanoke, Va. (Sand-and-Gravel): A. B. Rawn, Huntington, W. Va. (Slag): E. L. Wade, Baltimore, Md.

Region 5—(Crushed-Stone): T. I. Weston, Columbia, S. C. (Sand-and-Gravel): S. H. Livingston, Columbus, Miss. (Slag): C. E. Ireland, Birmingham, Ala.

Region 6—(Crushed-Stone): H. E. Rodes, Nashville, Tenn. (Sand-and-Gravel): H. P. Caldwell, Louisville, Ky. (Slag): Fred Hubbard, Columbus, O.

Region 7—(Crushed-Stone): R. S. Wilson, Little Rock, Ark. (Sand-and-Gravel): Robt. J. Potts, Waco, Tex.

Region 8—(Crushed-Stone): H. M. Sharp, Toledo, O. (Sand-and-Gravel): F. D. Coppock, Greenville, O. (Slag): W. E. Bliss, Columbus, O.

Region 9—(Crushed-Stone): W. R. Sanborn, Kankakee, Ill. (Sand-and-Gravel): E. Guy Sutton, Mattoon, Ill. (Slag): L. E. McDermut, Chicago, Ill.

Region 10—(Crushed-Stone): A. J. Blair, Milwaukee, Wis. (Sand-and-Gravel): H. N. Battjes, Grand Rapids, Mich. (Slag): K. A. Dietrich, Ecorse, Mich.

Region 11—(Crushed-Stone): C. A. Wagner, Sioux Falls, S. D. (Sand-and-Gravel): M. D. Butler, Grand Forks, N. D.

Region 12—(Crushed-Stone): R. C. Fletcher, Des Moines, Ia. (Sand-and-Gravel): W. M. Stoner, Lincoln, Neb.

Region 13—(Crushed-Stone): John Prince, Kansas City, Mo. (Sand-and-Gravel): Scott Fones, Pittsburg, Kan.

Region 14—(Crushed-Stone): M. W. Woodward, Rock Springs, Wyo. (Sand-and-Gravel): F. P. Spratlen, Jr., Denver, Colo. (Slag): Arthur L. Allen, Pueblo, Colo.

Region 15—(Crushed-Stone): Anson S. Blake, San Francisco, Cal. (Sand-and-Gravel): J. C. Buckbee, Los Angeles, Cal.

Region 16—(Crushed-Stone): Porter W. Yett, Portland, Ore. (Sand-and-Gravel): Geo. W. Gauntlett, Seattle, Wash.

(2) Members Chosen at Large

Region 7—(Crushed-Stone): W. F. Wise, Dallas, Tex.

Region 6—(Crushed-Stone): Thomas McCroskey, Knoxville, Tenn.

Region 3—(Crushed-Stone): W. M. Andrews, New Castle, Pa.

Region 2—(Crushed-Stone): Wilson P. Foss, Jr., New York, N. Y.

Region 13—(Crushed-Stone): E. J. Krause, St. Louis, Mo.

Region 14—(Sand-and-Gravel): Eric Ryberg, Salt Lake City, Utah.

Region 11—(Sand-and-Gravel): J. L. Shiely, St. Paul, Minn.

Region 6—(Sand-and-Gravel): W. H. Klein, Chattanooga, Tenn.

Region 7—(Sand-and-Gravel): J. Rutledge Hill, Dallas, Tex.

Region 9—(Sand-and-Gravel): G. W. Renwick, Chicago, Ill.

Region 8—(Slag): Earl L. Flad, Pittsburgh, Pa.

(3) Trade-Association Representatives

Region 5—(Slag): Geo. A. Mattison, Jr., Birmingham, Ala.

(Crushed-Stone): Russell Rarey, *Vice-Chairman.*

(Crushed-Stone): J. R. Boyd, *Treasurer.*

(Sand-and-Gravel): H. V. Owens, *Vice-Chairman.*

(Sand-and-Gravel): V. P. Ahearn, *Executive-Secretary.*

(Slag): C. L. McKenzie, *Vice-Chairman.*

(Slag): H. J. Love, *Recording Secretary.*

(4) Government Representative

Thomas McQuire, National Recovery Administration, Washington, D. C.

The joint session of the three aggregate associations began on Tuesday morning, January 29. Chairman Russell Rarey, president of the National Crushed Stone Assn., introduced Otho M. Graves, reëlected chairman of the Code Authority, as the first speaker. His subject was a report of the activities of the Code Authority for 1934. Mr. Graves stated that this report was available in printed form and that his remarks therefore would be confined to generalities.

In reviewing the report Mr. Graves stressed the fact that the aggregate industries under the code had contributed in large measure toward increased employment and increased incomes for their employees. The major tasks now remaining, in his opinion, was that of simplifying the code by discarding obsolete and valueless provisions which hamper the effective administration of other more important provisions; adding amendments to increase its effectiveness and assist in proper enforcement and compliance; reduction of the expense of code administration; combating the increasing production of materials by divisions of government.

Chairman Rarey expressed the appreciation of the associations for the work done by Mr. Graves as chairman of the Code Authority and declared the meeting open for discussion. Bruce Campbell (Harry T. Campbell Co., Towson, Md.) proposed revision of the present code setup to give more power to each district, especially in the matter of enforcement, citing the successful experience in his district where this plan has been followed to the greatest possible extent. Mr. Rarey then suggested that the chairmen of the various Regional Committees be heard from.

J. Rutledge Hill (Gifford-Hill & Co., Inc., Dallas, Tex.) stated that in his opinion the aggregates code needed to be more thoroughly sold to producers, contractors, consumers, the public, etc., and that each producer should coöperate in this. Mr. Rarey, as chairman of Region 8, said that enforcement in this region was materially aided by the enactment of the Ohio Recovery Act which parallels the National Recovery Act in practically every provision. As a result an alleged violator can no longer plead lack of jurisdiction. The situation, he said, was further strengthened by the passing by the Ohio State Legislature of House Bill 102 which makes it illegal for anyone connected with the distribution of public funds to place an order or contract with anyone who does not submit an affidavit of compliance with his bid, this affidavit also affirming that he has listed his property for taxation and that he is conforming to and made his payments to the state workmen's compensation fund.

In response to a request from Chairman Rarey for questions, Ray V. Warren (Western Pennsylvania Sand & Gravel Assn., Pittsburgh, Pa.) asked how a district committee could enforce on a producer the provision that he must supply a tonnage affidavit form, properly executed. Mr. Ahearn replied that such a request was within the delegated powers of such a body and that persistent refusal justified the citation of the producer to the proper adjustment agency for code violation. Complaints should first be referred to the regional or district adjustment agencies unless circumstances make it more desirable for the Trade Practice Complaints Committee itself to take initial charge. The producer accused may exercise his rights in that re-

gard. In case of failure of either of these bodies to effect a settlement the case would be referred to the Compliance Division of the N.R.A. and could be carried on up to the Supreme Court if necessary. He advised, however, that the local agencies apply all possible powers to effect compliance to prevent a flood of cases which the higher bodies could not handle.

W. W. Gibson, Minneapolis, Minn., evoked from Mr. Ahearn an explanation of the present setup of enforcement agencies and their order of importance and scope. He also advised against turning over complaints directly to legal bodies which are already swamped, as this would be a confession of the incapacity of the industry to govern itself. Anson Blake (Blake Bros. Co., San Francisco, Cal.) then told of the success of regional committees and adjustment agencies in California in the adjustment of complaints by arbitration and endorsed Mr. Hill's suggestion that more educational work was necessary. F. P. Spratlen, Jr. (J. W. Brannan Sand & Gravel Co., Denver, Colo.), brought up the question of personal liability of members of the Code Authority and its subdivisions for actions of these bodies. Mr. Graves replied that the N.R.A. holds that no officer or member of these bodies shall be held personally liable for any act of these bodies which is in the line of its duties unless malfeasance in office or wilful negligence can be clearly shown.

J. R. Chamberlin (The Mann Co., Norristown, Pa.) asked if bids made by parties who have not paid assessments can be disqualified. Mr. Ahearn replied that the payment of assessments is one of the requirements of the code as amended and is enforceable as such. He stated that about 46 contracts have already been cancelled on these grounds.

At the request of G. F. Driscoll (District 3, Region 8, Wilmington, O.), Mr. Ahearn explained how the 46 contract cancellations previously mentioned were obtained. According to Mr. Ahearn, authority for such procedure is embodied in Executive Order 6646 which requires compliance in order to participate in a federal contract. Mr. Graves arose to state that of about 268 complaints which had been pressed before the Committee only about 5 had been appealed to the Compliance Council of the N.R.A. M. DeGlopper (Secretary, Region 10, Detroit, Mich.) had much to say in commendation of the code and the various bodies formed under it, but suggested that more teeth be put into enforcement, especially among producers not operating under the code. He asked if any assistance may be expected in the way of the formation of rules interpreting the open-price policy which can be used as definitions of procedure within the law. Mr. Ahearn explained that the powers given to regional bodies in Administrative Order 109-10 were declared legislative rather than interpretive in Order 109-44 which was issued later.

A joint luncheon for all in attendance at the convention was held Tuesday noon and was well attended. Harold Williams, Boston lawyer, was the guest speaker and devoted his remarks to *Code 109 and Its Contribution to the Recovery Program*. In opening he stressed the fact that the purpose of the Recovery Act, of which the code is a part, is the improvement of the material condition of every man, woman and child in the United States and that every part of the recovery program finds its sanction and support in the fact that it is aimed toward the attainment of that purpose. He said that all over the civilized world efforts are being made to spread out the wealth among more people. In contrast to these efforts, which rely on a strong central government, said Mr. Williams, the people in this country believe that the government exists to serve their needs and recovery efforts are being made in accordance with this ideal. The right of every in-

The N.I.R.A., said Mr. Williams, is based on the theory that if we are to have a better and wealthier country with everyone in it better off, there must be increased buying power through increased wages and employment. The design of the recovery program to help industry renew itself therefore has as its primary purpose the betterment of the condition of the average individual. This, he said, is exactly the opposite of the former doctrine which tried first to improve the condition of business so that the people would prosper as a result. In every action taken by these industries this fundamental purpose should be kept in mind.

The N.I.R.A., said Mr. Williams, endeavored to assist business by removing those arbitrary and artificial legal restrictions which prevented group action without abrogating the anti-trust laws. The first thing to be done in such a program, he said, was to restore these industries to a fair profit-making basis and excessive price raises tend only to retard the program. Some price regulation was necessary to prevent suicidal competition and regulation of new productive investment was necessary to prevent tying up capital in useless plants which do nothing but harm to existing plants. He stated that in his opinion the present code is a masterpiece of construction and advised against any emasculation or alteration of it.

Progress under the code has been remarkable, said Mr. Williams, but most of the problems are still ahead. He mentioned the legal difficulties in the way and the limitation the interstate-commerce clause imposes on the right of the federal government to deal with industry where transactions do not extend beyond the boundaries of a single state. He also mentioned the constitutional provisions and legal principles which make very difficult the establishing of "permissive" areas. The law, said Mr. Williams, is a crystallization of public opinion which lags behind the actual facts but eventually catches up. When the public realizes that what the codes seek to accomplish is in its interest the law will conform itself to the new conditions. He also advised against too easily surrendering any privileges or provisions of the code because the temporary attitude of the administration may be unfavorable to them.

Chairman Rarey opened the Tuesday afternoon joint sessions and announced that the first subject for discussion would be the open-price policy and uniform terms of sale and credit practice. W. W.

(*Continued on page 53*)

Upper Left—Shovel loading to trucks in quarry for haulage to plant.

Above—The plant with washing screen, conveyor and hopper in foreground. The stone-sand equipment is not visible in this view.

Left—Gasoline-powered stockpile loader rehandling to truck.

Stone Sand Is Sold Under Copywrited Brand by Operator at Lexington, Ky.

THE Central Rock Co., Lexington, Ky., late in 1929 put into operation a new crushed-stone plant, its first venture into that industry. In the few years which have since elapsed this company has gained the reputation of being one of the most alert and progressive organizations in the industry and is recognized as a leader in its state. Since the code for the aggregates industries has been in effect members of this company have been active in promoting coöperation among producers in Kentucky. Improvements have recently been completed at this plant for the production of stone sand and the company is said to be the only producer of this material in the state.

The plant, when built, had a capacity of 50 tons per hr. and produced only the usual sizes of stone and dust. In 1932 a new quarry was opened and trucks were purchased to replace the former haulage system. A vibrating screen and belt-conveyor were also added in that year to allow washing the finished materials before shipping or stock-piling. In July, 1933, the latest developments, consisting of equipment for crushing, screening and classifying stone sand, was completed. This product is sold under the copyrighted name of "Sandag" and meets all state highway specifications. The plant now has a capacity of 75 tons per hr., including sand which averages over 20 per cent. of the total production. Most of the fines now utilized as sand were formerly wasted as the demand for agstone has been low for a number of years. Over 80 per cent. of the total production of fines is now marketed. Most of this sand is sold for concrete work as there has been little demand for plaster sand.

The original plant was completely described in the February 26, 1930 issue of PIT AND QUARRY but operations have since been altered to such an extent that a brief description of the entire operation is necessary for a clear understanding of the methods now in use. In the quarry, which now has a 26-ft. face, the drilling is done by an Ingersoll-Rand wagon drill. A Northwest 1-cu.yd. gasoline shovel is used for loading stone and an Erie steam shovel for

stripping. Three 5-ton Mack trucks haul the stone a distance of about 500 ft. to the plant, and three other trucks are used for stripping, stock-piling, etc.

The trucks dump the stone into the Telsmith 13A gyratory primary crusher. This discharges into a bucket-elevator feeding a 4-ft. by 12-ft. revolving scalping screen. The screen and crusher openings vary depending on the types of material most in demand. When a large percentage of small material is desired, stone is diverted from the scalping screen to a Telsmith 36-in. Gyrasphere crusher. This feeds a second elevator which also receives the product of this screen.

Coarse sizing is done by a 4-ft. by 20-ft. Telsmith revolving screen which can be used to remove undersize or oversize or both. When desired, stone over 2½-in. in size can be returned to the Gyrasphere crusher instead of being chuted direct to storage. All the other sizes are fed to three vibrating screens which insure accurate sizing and the removal of all the fines. These include a Tyler 4-ft. by 5-ft. Hummer double-deck screen, a Telsmith 3-ft. by 6-ft. double-deck screen and a 4-ft. by 5-ft. Telsmith single-deck screen. Usually these screens produce three coarse sizes which are chuted to storage-bins. The two Telsmith screens also produce the dust which is chuted to another bin. At a glance it may seem that there is an excessive amount of screening capacity at this plant. Actually, however, this capacity is necessary as over 20 per cent. of the total production is dust and sand even under normal operating conditions. The present arrangement also gives absolute flexibility and control of sizes. The five storage-bin compartments have a combined capacity of 500 tons.

Cars can be loaded under and trucks alongside the five storage-bins, which are of timber reinforced with steel. Material to be washed is fed from the bins through chutes on one side to a 16-in. horizontal belt-conveyor which operates on 40-ft. centers and is equipped with Goodyear belting. This conveyor discharges the material on the Telsmith 3-ft. by 6-ft. vibrating washing screen which is fitted with Binks spray nozzles. Washed materials go to a small bin for direct loading into trucks.

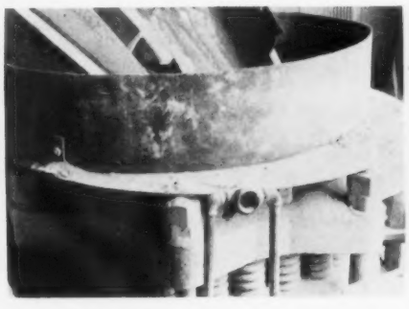
The dust and screenings go from storage by gravity to a short belt-conveyor feeding the first of two Columbus Conveyor Co. 18-in. by 22-ft. sand-drag boxes which discharges to the second box. Sand is discharged to a 50-ton bin from which cars or trucks can be loaded. A reclaiming elevator has been installed to handle stock-piled dust through the sand plant. Each of the machines in the sand plant is driven by an individual Master gearmotor, the conveyor by one of 3 hp. and the two drags and elevator by 5-hp. gearmotors. The Telsmith Gyrasphere crusher is driven by a 50-hp. motor through Texrope. Goodrich belting is used on the sand conveyor.

The overflow from the two sand drags and the washing screen is piped to a combined filter and settling basin of concrete which was completed in the summer of 1934. This is 57 ft. long and 20 ft. wide and has a settling area of 500 sq.ft. and a filter area of 250 sq.ft. A pump supplies the plant with about 250 gal. per min. of fresh water from a spring-fed well and this is supplemented by clear water from the filter. A 3,000,000-gal. reservoir has been excavated at one end of the quarry for additional water-supply; this also serves to drain the quarry.

The double-deck electric vibrating sizing screen.

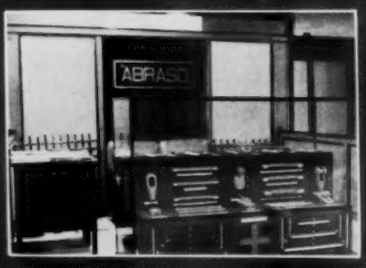
Shipments are about equally divided between truck and railway haulage. A short siding connects the plant with the L. & N. Ry. from which connections can be made inside the switching limit of Lexington to the Southern and C. & O. Lines. A Weller electric car puller is used to place cars for loading. A Barber-Greene stock-pile loader purchased in 1933 is used to load from stock-piles. A complete laboratory has been established and this is used for company tests and by state highway inspectors.

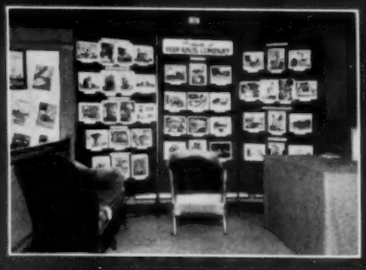
The two drag boxes in the stone-sand department.

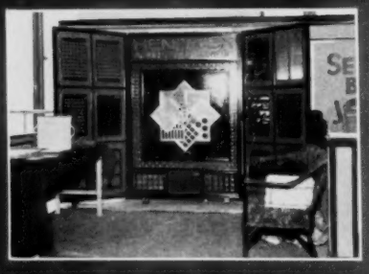


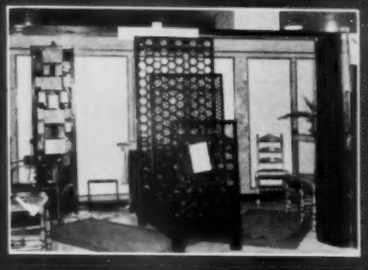
The 36-in. spherical-head secondary crusher.

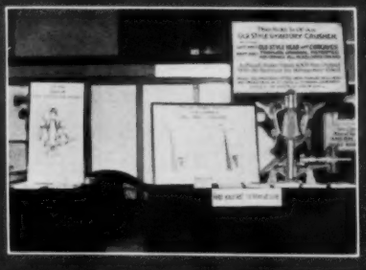
The single-deck vibrating washing screen with spray nozzles.

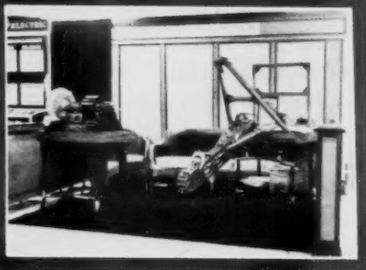


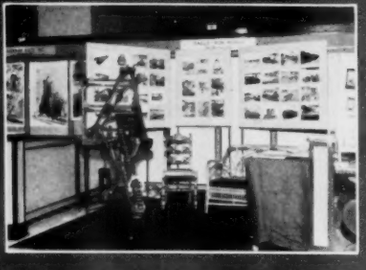












EQUIPMENT EXHIBITS

Productive Equipment	Roebling	Lima Locomotive
Link-Belt	Blaw-Knox	Hendrick
Cross	Traylor	Streeter-Amet
Pioneer	Hercules	American Manganese
Tyler	American Steel & Wire	Eagle
General Electric		Simplicity

Sand-and-Gravel Men Cheerful Over Present Construction Outlook

H. V. Owens, Utica, N. Y., again chosen president of the National Sand & Gravel Assn.

IMPROVED conditions experienced in the sand-and-gravel industry in 1934 will continue in 1935, according to a consensus of opinion of leading producers in various sections of the United States as expressed at the nineteenth annual convention of the National Sand & Gravel Assn.

Another "high spot" of the separate meeting for the sand-and-gravel industry held on January 30, was the warning sounded by President H. V. Owens that the foundation of the N.R.A. may be crumbling and, as a result, producers must be prepared to present a united front through the medium of the association to carry on the unified accomplishments of the past year or two of the Code Authority regime.

H. V. Owens (Eastern Rock Products, Inc., Utica, N. Y.) was reëlected president of the association for 1935, as were Vice-President George W. Renwick (Chicago Gravel Co., Chicago, Ill.) and Secretary-Treasurer H. S. Davison (J. K. Davison & Bros., Pittsburgh, Pa.). President Owens and V. P. Ahearn, executive secretary, were chosen Code Authority representatives. Alexander Foster, Jr. (Warner Co., Philadelphia, Pa.), L. T. McCourt (Central Sand & Gravel Co., Memphis, Tenn.), M. A. Neville (Western Indiana Gravel Co., Lafayette, Ind.), and Eric Ryberg (Utah Sand & Gravel Co., Salt Lake City, Utah) were chosen as the four members of the Executive Committee. All were re-elected with the exception of Mr. Ryberg, who replaces Paul P. Bird of Boston, Mass.

Chosen as members-at-large on the Board of Directors were Otto S. Conrades (St. Louis Material & Supply Co., St. Louis, Mo.), J. L. Shiely (J. L. Shiely & Co., St. Paul, Minn.), and Anderson Dana (Seaboard Sand & Gravel Co., New York, N. Y.).

The Wednesday session opened with a brief address by President Owens. He urged that the members continue their support of and confidence in the association, particularly since it is believed in some quarters that the United States Supreme Court may hold the entire N.R.A. structure to be without constitutional sanction in the near future. In that event, he pointed out, the industry would more than ever be forced to rely upon the organization to carry on the work which has already been done toward establishing the open-price policy and production-facilities control, and toward determining uniform terms of sale and credit practices.

Other matters of importance facing the sand-and-gravel industry, he declared, were code affairs, increased freight rates, and the diversion of gasoline taxes and motor-license fees. He pointed out that much of the organization's efforts in the past year have been expended on the code, leaving less time for ordinary association business. He praised the association and its executive personnel for the many accomplishments of the past year, pointing out that considerable confusion and uncertainty of a costly character had been avoided which might otherwise have resulted had the organization not been "on its toes" to meet with a frontal attack every difficulty looming on the industrial horizon.

Before the convention program was able to get under way, Robert J. Potts (Potts-Moore Gravel Co., Waco, Tex.) obtained the adoption of a motion to consider the matter of consolidation of the association with the National Crushed Stone Assn. and the National Slag Assn. A committee, headed by Mr. Potts and including Messrs. Bird, Foster and Neville, was appointed by President Owens to draw up a resolution which was adopted later in the day and which read as follows:

"RESOLVED, that the Board of Directors of the National Sand & Gravel Assn. is hereby empowered and authorized to take such action as in its judgment seems desirable for effecting a consolidation of the association with the National Crushed Stone Assn. and/or the National Slag Assn. if the emergent nature of circumstances is such that prompt action is necessary, and if the Conference Committee, heretofore appointed as between these associations, recommends to the respective Boards of Directors that physical consolidation and/or the creation of an agency to coördinate mutual problems will

NATIONAL SAND AND GRAVEL ASSOCIATION
1935

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be in the interest of the advancement of the industries concerned."

The crushed-stone and slag groups, in session at the same time, were informed of the action.

V. P. Ahearn, executive secretary, announced that, due to his close attention to work involving code activities, he would present no formal annual report as has been his custom in other years. He and Stanton Walker, director of the Engineering and Research Division, now have offices in the same structure, the Munsey Bldg., at Washington, and he said that this physical advantage has made almost daily contact and coöperation possible, to the benefit of the association and the industry.

Pointing out the recent presentation of evidence before the Interstate Commerce Commission in Ex Parte 115 as an example of association effort, Mr. Ahearn convinced his listeners of the utter impossibility of presenting a united front in combating the proposals of the carriers for higher rates without some organization such as the association to handle the case. The case marked a definite progressive step in the annals of the aggregates industries, Mr. Ahearn said, in that it was the first time the three associations had pooled their efforts in fighting for a common cause. "On the basis of the evidence presented, I can predict nothing but victory for our industries when the findings of the Commission are announced," he declared.

Mr. Ahearn deplored the action of the various divisions of the government who are competing with operators by producing their own aggregates for various public-works projects and warned those assembled at the meeting that an even greater output by government-operated units may be expected during the present year. He cited the unsuccessful attempt made last year by the association to force the government to abide by code provisions, as an example of gross unfairness to private industry, closing his talk with an urgent appeal that all gravel producers, individually as well as collectively through the association, file protests against the continued encroachment of governmental agencies upon the aggregates-producing field.

Upon the motion of Alexander Foster, Jr., the members unanimously approved the preparation of a resolution which will denounce, in no uncertain terms, the assumed right of the government in this regard.

State-highway departments are rapidly adopting the standard specifications for sand and gravel as prepared by the association, according to Stanton Walker, director, Research and Engineering Division, in his report of technical progress during the year. He cited the advances being made in studies on the durability of aggregates and the classification of materials suitable for use in fireproof concrete.

"It seems quite probable at this time that sand and gravel of a siliceous nature will prove to be not of the highest value when used as concrete aggregate in fire-resisting structures and, since the large proportion of our tonnage is represented by this type, it is a matter of extreme interest to the entire membership. The National Committee on Reinforced Concrete is giving special attention to this problem and it is our aim to see that our material gets the highest recognition possible," said Mr. Walker.

The association's efforts to change testing specifications so that square-mesh sieves be employed rather than those with round holes in the determinization of sizes is bearing fruit, Mr. Walker pointed out. West Virginia and Ohio have adopted the square-mesh as standard and Michigan favors the change and will include it in its specifications shortly, according to him. Another technical matter now being worked out in the association laboratory is a series of sizes of material for bituminous mixtures, he announced.

The first paper of the morning session was presented by Edwin Brooker, commerce counsel, Washington, D.C. Mr. Brooker was retained by the aggregates industry formally to present its case before the I.C.C. in Ex Parte 115 and his talk was

built up largely on statistics developed in that case. his paper, *Effect of Transportation Methods and Costs on the Sand-and-Gravel, Crushed-Stone, and Slag Industries*, dealt with the trend toward motor-truck shipment of aggregates since 1928, pointing out that each increase in freight rates was soon followed by a loss to the carriers in the tonnage moved by railways. In each one of the last five years there has been a greater percentage of the total production moved by motor trucks, transportation by water remaining fairly constant, the railroads taking the loss. The following table shows the percentages of sand and gravel moved by type of transportation since 1929:

Year	Railways	Motor Trucks	Waterways
1929	74.0	15.6	10.4
1930	71.9	16.3	11.8
1931	70.3	17.8	11.9
1932	66.0	23.2	10.8
1933	65.0	21.3	13.7
1934	65.8	24.3	9.9

"The total production of sand and gravel, excluding glass and molding sand and ballast, for the year 1928 was 174,481,145 tons. For the year 1933 the production was 98,327,602 tons. The 1933 production represents only 56.4 per cent. of the 1928 production of sand and gravel. On the other hand, the railroads originated 85,667,157 tons of sand and gravel during the year 1928 and only 21,818,258 tons during the year 1933. The railway tonnage during the year 1933 was only 22.2 per cent. of their 1928 railway tonnage. This shows that production has declined 43.7 per cent. and railway tonnages of sand and gravel have declined 77.8 per cent. since 1928," Mr. Brooker reported.

"By not maintaining their 1928 ratio of 47.9 per cent. of the production, throughout the five-year period subsequent thereto, the railroads have suffered losses totalling 114,090,000 tons, or 2,075,900 car-loads of sand, gravel and crushed stone. At an average freight rate of only 50 c. per ton, it represents a loss to the railroads of approximately $57,040,000.

"The great difficulty in the past has been that the railroads have underrated the claims of the railway shippers concerning the competition with materials from wayside pits and quarries operated as either stationary or temporary producing units, as well as the competition with materials produced by non-commercial operations, all which are using trucks as a method of transport," Mr. Brooker pointed out. "They have seemed to regard the trucks as a competitive factor only in connection with movements from railway plants to short-haul territory surrounding such plants and have disregarded trucks as a competitive factor in depriving railway shippers of business and depriving them of tonnage in the other territory, because of the greater use of materials from non-railway plants. This is best illustrated," Mr. Brooker said, "by the fact that in the present proceedings, Ex Parte 115, before the Interstate Commerce Commission involving increases in the rates, they have not proposed increases in the rates on these commodities where the rates are 60 c. per ton and less."

Mr. Brooker believes all shippers want the railroads to receive such revenues as are necessary successfully to maintain their status as a rail-transportation system, yet, if the normal freight levels will not allow these commodities to move freely by rail, then, if the railroads desire any of this tonnage, they should in the first instance place in effect the lowest possible general rate levels, those to be followed by any special reductions necessary to move the materials by railways.

The renewed interest in cement-bound macadam roads as a means of providing hard-surfaced highways at low cost was explained in a paper and by a motion-picture after the talk by L. F. Arms, Portland Cement Assn. highway engineer. Mr. Arms' paper dealt principally with the test road of 81 sections built at Elmhurst, Ill., by the cement association recently to determine the type of materials, gradation of aggregates and other factors best suited to building this type of road. Mr. Arms pointed out that as long ago as 1872 this method of construction was used to pave streets in Edinburgh, Scotland, and that these 63-year-old pavements have required little maintenance and are still in service. Early in this century a number of cement-bound macadam roads were built in New England and the Pacific Northwest, much of them still being in service. After having been nearly forgotten for many years, cement-bound macadam is again being widely used for secondary roads at a cost considerably below that of the conventional concrete road.

The Elmhurst test road, of 81 sections, each employing a different type of material and on which varying construction methods were used, had 23 sections on which gravel was employed. Different sizes and gradation were used on the 23 gravel sections, an attempt being made to have the gravel as free as possible from crushed particles, since it was desired to compare it with the crushed stone and slag used on the remaining sections.

Mr. Arms interestingly described the method of preparing the subgrade, the light rolling of the aggregates before impregnating them with the cement

J. C. Buckbee.

Paul P. Bird.

grout, and the various finishing methods employed.

"Judging from the experience at the Elmhurst test road, good gravel does not suffer by comparison with any other aggregate for use in cement-bound macadam," Mr. Arms declared. "Because of its low voids the grout consumption was low. Good strengths were obtained. There was no difficulty in producing a satisfactory surface."

Before adjourning for luncheon, Otho M. Graves, chairman of the aggregates code authority, addressed the convention briefly. Mr. Graves, who heads the General Crushed Stone Co. of Easton, Pa., referred to the community of feeling existing today between the sand-and-gravel and crushed-stone industries. He expressed the belief that this cooperative spirit will continue to grow and that the interchange of experience and contact will be of untold benefit to both groups.

Returning from luncheon, the convention resumed its program with Eric Ryberg, newly-elected member of the Executive Committee acting as chairman. Local business conditions were reported upon by producers from various sections of the country. E. Guy Sutton (Neal Gravel Co., Mattoon, Ill.) thought that conditions in Indiana and Illinois would be about the same in 1935 as in 1934. Indiana, he said, will have about $10,000,000 for road building, while Illinois expects to spend $25,000,000 for highways and grade separation. He predicted the end of diversion of gasoline-tax receipts after June 1 of this year in Illinois. This cheering note in the diversion picture brought applause from the operators.

Kentucky and Tennessee producers are a little optimistic over what 1935 holds in store, according to H. P. Caldwell (Ohio River Sand Co., Louisville, Ky.). Private building is improving somewhat, he said, while the T.V.A. developments in Tennessee have been over-emphasized as far as benefits to producers as a whole in this area are concerned.

Gains ranging from 10 to 30 per cent. were made in Ohio in 1934, Stephen Stepanian (Arrow Sand & Gravel Co., Columbus, O.) estimated. Private building has been poor, construction using federal funds very good, and the demand for ballast fair, he said. Legislation halting diversion of Ohio highway funds is in preparation, he reported. As an example of what coöperative effort among plant operators can accomplish, Mr. Stepanian declared that there are four major plants, including his own, which serve the Columbus area. With demand slow, none were able to show a profit from their operation. By agreement each of these four plants is to operate on full schedule for a year and remain idle for three years. This will give each plant an opportunity to show an excellent profit for a year, while in the other three years there will be no income, but neither will there be any appreciable overhead expense to be met.

Ray V. Warren (Western Pennsylvania Gravel Assn., Pittsburgh, Pa.) declared that prices were somewhat better and production 20 per cent. greater in Western Pennsylvania and West Virginia than in 1934. This year will be still better, he asserted. Considerable industrial building is in prospect in the Pittsburgh area, twelve major highways are to be built and two government-financed dams are in prospect. In the city of Pittsburgh $20,000,000 in the form of P.W.A. loans will be expended for bridges and tunnels.

Robert J. Potts.

E. Guy Sutton.

The bright spot in Texas for aggregates producers will be the erection of twelve or fifteen river dams for storing irrigation water, costing about $50,000,000, according to Robert J. Potts of Waco, Tex. In general 1934 business was 10 per cent. below that of 1933, he declared.

In New England the low point of the depression was reached early in 1933. Since that time business has definitely been on the upgrade, with 1934 showing a 25-per cent. gain, said Paul P. Bird of Boston. Additional improvement is looked for in 1935, he reported.

Alexander Foster, Jr., of Philadelphia, said that, while last year was about 15 per cent. better than 1933, this year's developments are uncertain. A huge government housing project and a sewage-disposal plant at Philadelphia are two definite opportunities.

J. L. Shiely, whose operations extend from Minnesota to the Pacific Northwest, sees the portable plant near the scene of the big construction jobs as the salvation of the producer. Mr. Shiely supplies materials for the 8-mi. Cascade Tunnel of the Great Northern Railroad and is supplying aggregates on a 5,000,000-cu.yd. order for the Fort Peck Dam. Government work is no bed of roses, however, according to Mr. Shiely, who described the complications involved in attempting to comply with a variety of specifications.

Dr. R. R. Sayers, medical officer in charge of industrial hygiene, U. S. Public Health Service, spoke on *The Effect of Breathing Siliceous Dust.* He defined silicosis as "a disease of the lungs caused by the inhalation of siliceous dust, causing the formation of fibrous nodules in the lung tissues." He declared that the disease is contracted gradually by workers exposed to the dust, that age is of no importance as influencing susceptibility, and that the disease occurs in every climate throughout the

world. Victims of tuberculosis develop it most rapidly, he declared, and urged that no operator allow a man with tuberculosis in any stage to work in the dust.

Only the small particles—1/25,000 of an inch or smaller—are harmful, he said, the larger particles failing to enter the lungs. Not only the presence of silica dust in the lungs but the chemical action which kills tissue is responsible for the ravages of the disease, Dr. Sayer said.

Prevention of the disease lies almost entirely in mechanical control, such as dust traps around drills, wet-drilling methods, doing the blasting at the end of a shift, and the compulsory wearing of masks and respirators.

Dr. Sayers' talk was illustrated with slides showing charts, tables, photographs of silicosis victims in various stages of the disease, and photo-micrographs showing the effect of dust on the lung tissues.

B. C. Tiney, highway engineer for the Calcium Chloride Assn., Detroit, Mich., discussed the potential market for prepared sand and gravel in its construction of roads "stabilized" by the addition of calcium chloride. He traced the development of the sand-clay road since Dr. Strahan's experiments in 1906. He pointed out that the ordinary gravel road needs constant maintenance to keep it in shape for traffic and that much of the material is lost by the traction of moving vehicles and by the action of the wind.

The important essential, according to Mr. Tiney, in retaining the stability of these roads is the regulation of the moisture content. If the wearing course is allowed thoroughly to dry, the result will be raveling and dust. If kept damp, the surface resists the action of traffic and winds in dry weather. A damp surface, if properly crowned, sheds storm water with only a slight softening effect.

The speaker pointed out that the regulation of moisture content in "stabilized" mixtures is accomplished by the use of calcium chloride. The water-absorbing properties of this chemical cause it to form, from air and road moisture, a solution which permeates the wearing course and is very resistant to evaporation. In dry weather this solution is drawn by capillarity close to the road surface where it forms a protective seal against the loss of moisture from the body of the wearing course.

"Many plants have been designed primarily for the manufacture of washed aggregates for cement concrete or bituminous mixtures, and have accumulated large waste piles of the fines which are so essential in filling out the grading of a stabilized mixture. Stripping from pits often involve soil of a cohesive nature which might serve well as a binder material. The possibility of utilizing a part or all of what are now waste products naturally has an appeal to the producer. Some pavement-aggregate plants produce an excess of certain sizes which might be worked into the design of stabilized mixtures.

"The density of a stabilized wearing course often equals that of concrete, and while the cost per mile is only a small fraction of the cost of the pavement, the volume of aggregate used per cubic yard of finished road metal is approximately the same for either type of road.

"Delivery of ready-mixed material to the project would eliminate a large part of the blading on the road. The present system of drying and pulverizing clay on the road involves considerable loss of time in rainy weather and such delays would not occur with the use of premixed materials."

The problem of drying and pulverizing clay at central plants will call for varying methods of solution, according to the nature of the clay and plant conditions. Research work on the subject is being conducted by one of the member companies of the Calcium Chloride Assn. This company plans to build an experimental drying, pulverizing and mixing plant and probably will have some interesting information available within the next few months, Mr. Tiney said.

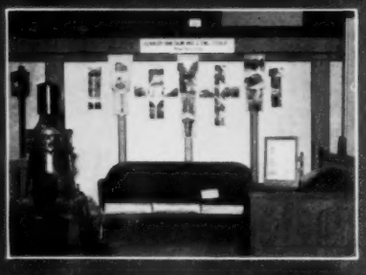
Another phase of the use of gravel in road building was described by Bernard E. Gray, chief highway engineer of the Asphalt Institute. Within recent years gravel has been used in bituminous road construction on an increased scale and Mr. Gray outlined the present uses of sand and gravel in bituminous mixtures and discussed the possibility for still greater utility in that field.

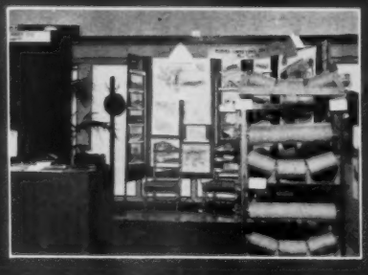
"A good subgrade with a comparatively thin wearing surface is going to be the practice in the future for constructing low-cost roads," Mr. Gray predicted. The trend seems to be away from the road-mixed type of material to that of closely-controlled plant-mixed materials, he said.

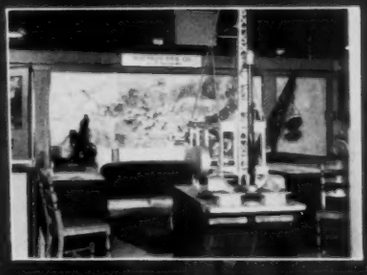
The road-mixing method, explained the speaker, originated in the West. Oils were used originally with pit-run aggregates. Improved methods later brought better and more durable bituminous binders and the necessity for a better gradation of aggregates.

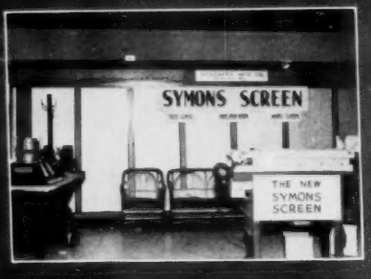
"The stability and durability of the aggregate has been the criterion of success in bituminous road-building," he declared. Kerosene has proved to be the best solvent for cold-mixed material since it does not evaporate easily and makes a better binding medium. Plant-mixed materials may be mixed and stored in any desired quantity and used months later without impairing their suitability, Mr. Gray asserted.

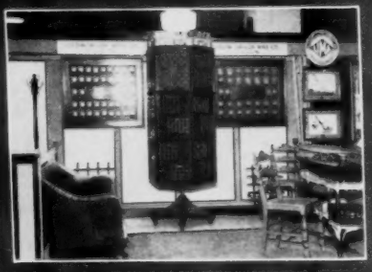
Another growing use for bituminous mixtures is in the preparation of mats for flood-control work. Experiments were started two years ago, Mr. Gray explained, and one large plant is now engaged in preparing and laying these revetments at a cost of $16 to $18 per 100 sq.ft. He sees a tremendous field here for the aggregates producer along Mississippi River and other waterways where the menace of floods is annually present. The mats as now used employ a 40-mesh wire reinforcement, with ring bolts fastened in place to facilitate handling and placing by crane.











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Jaeger	Marion	Thew
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Bituminized Aggregates Interest Crushed-Stone Operators at Convention

Russell Rarey, who continues in office as president of the National Crushed Stone Assn.

INDEPENDENT sessions of the National Crushed Stone Assn. which were held on January 30 were devoted to association business and reports, and a number of highly interesting papers were presented. The subject of paramount interest to those present was the growing tendency toward the bituminizing of aggregates by crushed-stone producers and most of the discussion had to do with this subject. The papers presented discussed bituminized aggregates from many angles including research and tests by the association, advanced methods for laying roads of this material and trends in highway design and construction toward the use of this type of material for low-cost secondary highways. Speakers on all of these subjects were authorities in their respective fields and considerable discussion followed. A cheering note was sounded in the reports of directors on business conditions and the outlook for the coming year.

The morning session, presided over by Russell Rarey, president, was opened with the reports of directors on business conditions and the outlook for the coming year. As these directors represent all sections of the country and practically every state in the Union their combined opinions should be indicative of the sentiment of the aggregates industries as a whole. Summarized, these reports indicate a substantial increase in the volume of 1934 business over that of 1933. A few reported decreases due to special local conditions but most of the reports showed increases of 10 to 30 per cent. Prices also averaged considerably over the 1933 average, individual reports showing increases up to 20 per cent. In almost all cases the increase was at least sufficient to compensate for the higher cost of operation due to the code.

Many sections reported that most of their business came from various federal projects while in other sections little of this influence was felt. In several states business slumped badly due either to curtailment of highway expenditures or to production by these states of practically all aggregates required for this work. There was some increase in ballast requirements by railroads although this demand was spotty and affected only a small minority of producers. The competition of government- and contractor-operated plants and the growing diversion of gasoline taxes are still regarded as the chief deterrents to a return to normal conditions.

Prospects for 1935 were almost unanimously optimistic, increases of 10 to 25 per cent. in volume and some increase in prices being predicted. Increases are expected in demands for ballast and agricultural limestone. Any increase in government requirements above those now definitely scheduled would materially improve prospects. A growing realization of the importance of by-product markets was evident. Many producers reported having installed equipment for bituminizing aggregates and those already operating such equipment reported sharp increases in business due to the great amount of secondary road construction done during 1934.

J. R. Boyd, secretary of the association briefly reviewed its financial condition which he said was the best in its history due to the additional revenue obtained from the association's code activities.

A. T. Goldbeck, director of engineering and research, then reported on the activities of this department. He briefly reviewed the trend since 1931 toward low-cost bituminous road construction and the work done along these lines to develop crushed-stone bituminous mixtures to their highest state of efficiency. Problems before his department included stability under traffic; durability under the action of freezing and thawing, water and traffic; resistance of aggregates to traffic and to the weather.

Mr. Goldbeck reviewed the development by his department of a suitable laboratory device for testing the properties of low-cost mixtures, one giving results which would be recognized by engineers as having practical significance. This device consisted of a small circular testing track which has been described previously in these pages and which practically duplicates actual road conditions. Means

NATIONAL CRUSHED STONE ASSOCIATION
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are provided to control the temperature of the material being tested. Tests made with this machine, he said, demonstrated that the stability of various pavement sections tested was in proportion to the percentage of crushed aggregate present. Other tests showed that the percentage of asphalt seemed to have very little effect on the stability of the pavement sections and that the oustanding differences were due to the characteristics of the aggregate alone. It was also noted that the usual physical tests for percentage of wear or for toughness or hardness do not always reveal the resistance of aggregates to the crushing action of the roller or of traffic.

One series of investigations made clearly demonstrated this fact. After the track tests were made samples of the same rocks were tested by the Bureau of Public Roads in the so-called Los Angeles rattler. This rattler consists of a cylindrical drum 28 in. in diameter and 20 in. long, mounted longitudinally on a horizontal shaft and having a shelf 4 in. wide extending from end to end on the inside. An abrasive charge of twelve 17/8-in. cast-iron balls is used. A comparison of test results showed that the rattler closely approximates the action of traffic. Mr. Goldbeck stated that as a result of the efforts of his department some of the rocks formerly rejected are now acceptable, benefiting a large group of crushed-stone producers.

A series of tests was also undertaken to determine the most desirable type of amiesite mixture, taking all things into consideration. These tests were made conforming to the specification requirements of the states of Pennsylvania, New York, New Jersey and Delaware, these states having a wide range in specifications. The circular-track tests showed wide ranges in characteristics with the pavement at a temperature of 94 deg. F. Test results, according to Mr. Goldbeck, indicated that an open texture was desirable from the standpoint of manipulation in laying the cold type base-course mix and that the gradation should be such that a comparatively small amount of fines be included. It was also found economical to use a comparatively large maximum size of aggregate depending on the thickness of the base course.

Mr. Goldbeck also described a series of investigations of the durability of the top course. For this purpose indications were that intermediate gradations gave highly-durable sections while extremely open sections were not as durable as those containing a somewhat larger amount of fines. He stated that it seems desirable to use a certain amount of fines in the topping course and that something under 25 per cent. passing the No. 4 sieve gives optimum results.

A study was also made on the effect of varying proportions of the different ingredients of Amiesite mixtures. The same gradation of material was used in all of these tests. It was found, said Mr. Goldbeck, that it may be dangerous to use a percentage of liquefier as high as 1.50 as this leads to high instability and low durability. The lime was found to have some toughening action so that greater durability and stability result. Hydrated lime gave somewhat better results than the same percentage of limestone dust. The percentage of asphalt was also found to greatly affect the durability and the stability. Extremely soft and hard asphalts each had their disadvantages, the former resulting in low stability and the latter in brittle-

ness and lack of durability. As the result of these investigations, said Mr. Goldbeck, specifications will shortly be proposed for use as a standard for this type of mixture. During this talk slides were projected to illustrate the results of the various tests made.

The bureau also continued the tests on the effect of changes in temperature and moisture on the expansion and contraction of concrete which were begun in 1933. Many varieties of stone, gravel and slag were used in these tests in which moist concrete samples were subjected to successive temperature cycles ranging from 70 to 135 deg. F. These tests, said Mr. Goldbeck, resulted in all of the concrete specimens showing signs of distress at the end of 60 cycles. All specimens also showed an increasing total and residual expansion. Mr. Goldbeck also mentioned a series of tests to be undertaken to show the effect of vibration in the placing of concrete. A machine was built in 1934 to make laboratory tests and preliminary tests show that even the harshest concrete of low slump tamped well, which was regarded as especially advantageous where crushed-stone aggregate is used. Considerable discussion ensued on the application of this principle under job conditions.

The morning session was closed with a paper on *Advanced Methods for Bituminous Highway Surfacing* by Murray Anderson, division engineer, Ohio Dept. of Highways. Mr. Anderson described new methods used in Ohio for obtaining smoother and more durable bituminous road surfaces. He stressed particularly the success in that state with the laying of new pavement and the resurfacing of old with the least possible impediment to traffic. This was done by working on one-half of the road while the other half was kept open for traffic. Success of this method, he said, depends on the use of a material over which traffic can pass within a short time after it is laid without damage to the road or contamination of vehicles of flying bitumen-coated particles. Best results in this respect were obtained by the use of a 100 per cent. crushed gradation of material ranging from ¾ in. to ⅜ or ¼ in. in size.

At the afternoon session, presided over by W. R. Sanborn, reports of the auditing and resolutions committees were first presented. John Rice read the resolutions. The first was a petition that the government recognize as unfair competition plants operated by governmental bodies. It was also resolved that a committee of five persons be appointed by the board of directors of the association to consider a merger or consolidation of forces with the sand-and-gravel and slag associations, who would also appoint such committees. Otho M. Graves took the floor to endorse this measure which, he said, would enable the three industries to effectively handle their common problems, especially if the N.R.A. were not extended when it lapses in June. Both resolutions were passed by an overwhelming vote.

The subject of the first paper, which was presented by H. R. Clarke, engineer, maintenance of way, C. B. & Q. Ry., was *High Speed in Railroad Transportation and How This Development May Affect the Track Structure*. Mr. Clarke stated that the experience of his own road with the streamlined "Zephyr" indicated the necessity of a higher standard of maintenance and a higher degree of refinement although no important changes in present track structure will be necessary. He stated that the problem confronting the railroads is not only that of keeping track in shape for light-weight, high-speed trains; what complicates matters is the necessity of operating heavy slow strains, medium-speed trains, and very fast trains all on the same track. According to Mr. Clarke curves are the limiting factor in speed.

C. N. Conner, senior highway engineer, U. S. Bureau of Public Roads, in his paper, *Trends in Highway Design and Construction*, said that the sudden broadening of our national highway programs to include boulevards carrying heavy traffic through cities and land service roads carrying light traffic in rural communities has turned former trends into realities. The needed improvement of municipal highways and the 2,000,000 or more miles of roads feeding traffic into main highways, he said, has barely begun. He advocated advanced planning to develop a truly national highway system in which each of these elements is in its right place and stated that traffic surveys directed toward the discovery of factual data, even without the prospect of immediate utilization, should be provided for and undertaken. According to Mr. Connor the government is asking that 1½ per cent. of the apportionment to any state in any year under the Hayden-Cartwright Act may be used to undertake surveys, plans and engineering investigations of projects for future construction. This is an unprecedented opportunity for the states to gather and utilize factual data on which to base future designs.

Mr. Conner stated that projects in future programs should include the closing of gaps in the Federal-aid highway system; the elimination of hazards to highway traffic; the construction of parkways and recreational highways; the correlating and supplementing of existing transportation fa-

John Prince.

Porter W. Yett.

E. J. Krause.

A. L. Worthen.

cilities by road, rail, air and water, and providing of service to freight-receiving stations, airports, etc.; the appropriate landscaping of parkways or roadsides; reconstruction designed to reduce maintenance cost and decrease future state and local highway expenditures; providing a large number of small projects designed to employ the maximum of human labor and a substantial program of railroad grade crossing eliminations and protection. The character of improvements in present programs cover the entire range of surface types from sand, clay or gravel to sheet asphalt and brick surfaces on reinforced concrete bases.

According to Mr. Conner proposals for the elimination of railroad-highway grade crossings on a large scale have been outstanding in current discussions of Federal public works programs. The number of such crossings is variously estimated at about 240,000 and the estimated cost of their elimination is roughly estimated at $12,000,000,000. The average cost under the present program of eliminating 500 grade crossings is about $50,000. Classification of existing grade crossings will provide information on which to base a priority program of elimination.

It has been found, said Mr. Conner, that the largest mileage of roads needing improvement carry the smallest volume of traffic and that improvements on much of this large mileage is likely to be of low type at low cost. He also stated that roads were formerly built on flat grades with poor alignment but that it is now believed that vertical curvature with relatively steep gradients on reasonably direct alignment facilitates the flow of traffic better. All right-of-way for Federal highway projects must be furnished without cost to the government. Direct alignment of roads will not as frequently be sacrificed to obtain a right-angle crossing as in the past, but, instead, skew bridges will probably be used. These, said Mr. Conner, may require as much as 40 per cent. more cement and aggregates than do bridges making square crossings.

According to Mr. Conner, there are few trends of outstanding importance in the design and construction of bituminous-pavement surfaces on cement concrete bases. Better riding bituminous surfaces with skid resistant qualities are being obtained. Developments in the design and construction of concrete roads include the development of vibration in striking off and compacting concrete surfaces; wider use of metal joints and steel reinforcement; more accurate proportioning of aggregates used in cement concrete and the use of designed mixtures. The combination of two sizes of coarse aggregate to reduce segregation has become almost universal. In the field of low-type bituminous surfaces, he said, there have been many and marked advances made. These include: development from the haphazard experimental stage of a few years ago to a well-planned definite procedure; elimination of moisture in bituminous mixtures and uniformity and control of aggregates and bitumen; classification of subgrade soils and an understanding of their respective behaviour; selection of a few types of bituminous materials best suited for low-type construction and progress toward the development of a more uniform system of testing and specifying such materials; development of new special equipment.

The next paper, *Effect of Transportation, Methods and Costs on the Crushed Stone, Sand and Gravel, and Slag Industries*, was read by Edwin Brooker, commerce counsel, Washington, D. C. Mr. Brooker told of the inroads truck competition is making in railroad transportation of crushed stone and other aggregates and warned that if the railroads increase their rates on these commodities more business will be driven to trucks and small local operators at the expense of both the railroads and the large producers.

The report of the nominating committee was then presented by E. J. Krause. All recommendations were unanimously approved. Changes made were principally those caused by the death of former members or by a change in their connection with the industry, so that it was practically a reëlection of the officers and directors. President Rarey closed the meeting with a few words of appreciation.

C. S. Huntington.

F. O. Wyse.

Slag Producers Hear of Enlarged Market Opportunities and Results of Research

C. L. McKenzie who heads the National Slag Assn. for another year.

OF the three aggregates groups in attendance at the convention no one will deny that the National Slag Assn., in numbers, was greatly dwarfed by the other two. However, in spirit, unity of purpose, good-fellowship and effectiveness there is probably not an association in the country that can equal it.

Most of the sessions were closed sessions, for which no report can be given, but the session Wednesday morning contained three papers of unusual interest.

The first paper, entitled *An Oyster Bed-Time Story*, was at first thought to be purely humorous. It was presented by T. E. Sheafer, who told of the affinity of oysters for slag in reproduction. It seems they even prefer slag to their own oyster shells and under those conditions will reproduce faster and better than in any other known way; as our oyster beds are greatly depleted and, in many cases, facing entire destruction, a more serious and happy tone was injected in the audience when it was pointed out that to spread slag to a depth of four to six inches over the oyster beds of the country would create a considerable tonnage for slag producers.

H. F. Clemmer gave an interesting paper on *Bituminous Mixtures for Resurfacing*. This paper discussed the results so far obtained from laboratory and field tests on certain sections of a resurfaced pavement in Washington, D. C., wherein slag, sand and gravel and crushed stone were used in various tests, being subjected to as extreme conditions as possible, both from weather and traffic standpoints. This paper created a great deal of interest and discussion. The charts and pictures which accompanied it were unusually comprehensive.

Fred Hubbard, Director of Research of the slag association, presented a paper on one of the experiments that is being made in the "Ten Years' Series Tests" of the association.

Concrete test blocks were made of slag, sand and gravel and crushed stone in varying ratios of aggregate to cement. These blocks were placed on a trickle filter bed of a sewage disposal plant and tests for erosion, decomposition and loss of weight have been made periodically. The latest tests were made at four years and ten months of freezing, thawing and the general extreme conditions found at this disposal plant, and the results were extremely interesting. Mr. Hubbard has taken a great deal of pains in making his test accurate and fair and has made a chemical analysis of all materials. The results, after the end of ten years, should be very valuable for presentation. This paper is also fully illustrated by photographs and charts.

NATIONAL SLAG ASSOCIATION
1935

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Pre-Mixed Concrete Makers to Sponsor Studies of Technical Problems

THE National Ready Mixed Concrete Assn. held its annual meeting at the Palmer House, Chicago, Ill., January 31 to February 2, 1935. Meetings of the Code Authority for the ready-mixed concrete industry were also held during this period. This meeting marked the return of the association to its normal function of providing for coöperation and a mutual interchange of ideas among its members and of developing technical, marketing and other data useful to them. Unlike the meeting in Cincinnati in 1934, code matters were relegated to second place and the other problems confronting the industry received much-needed attention.

The sessions were opened on Thursday morning with H. F. Thomson, president of the association and vice president of the General Material Co., St. Louis, presiding. Mr. Thomson in a lengthy address reviewed the developments of the past few years, the present conditions in the industry and the prospects for the future. He stated that there is now undoubtedly a steady trend toward general business improvement and that this was also true of the ready-mixed-concrete industry, with variations in degree in each locality.

Mr. Thomson then commented on the great economic changes which have taken place since the last convention of the association in 1933. He said that the industry had turned one important corner during the intervening period almost without realization by individual producers. Many constructors formerly considered ready-mixed concrete to be an experimental product and every producer was fighting to have his material accepted by the local building industry. Now ready-mixed concrete is accepted for practically all types of construction, said Mr. Thomson, and the industry has passed from the pioneering to the strictly competitive stage. He also said that there has been established the realization that ready-mixed concrete, when properly mixed, delivered and placed, represents a better quality of concrete than is readily obtainable by usual job-mixing methods. This reputation, he said, is a valuable asset but can quickly be lost if standards are relaxed.

Mr. Thomson then told of the activities of the association with respect to a purchase specification for ready-mixed concrete which was first discussed at the 1933 convention in Detroit. This activity, initiated by the association, was later taken up by the A.S.T.M. and resulted in the adoption by this body of a standard specification. This, in effect, stamps the ready-mixed-concrete operation with the approval of the A.S.T.M., he said, and offers every operator ammunition to use in extending the use of ready-mixed concrete in his community.

There has also been carried on a development of contacts with governmental departments which has been of great value to the industry. Today, said Mr. Thomson, ready-mixed concrete is acceptable on every type of government construction and is recognized, or at least not discriminated against, in the specifications for most federal construction.

Mr. Thomson then briefly reviewed the work done by the association in connection with N.R.A. code activity with which it was in touch from its very inception. The association, he said, was recog-

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A. C. Avril.

H. F. Thomson, reëlected president of the National Ready Mixed Concrete Assn.

▼ ▼

J. E. Burke.

nized as the representative of the industry and developed a Code of Fair Practice which was accepted and became effective early in March, 1934. This code has eliminated a great many irregular practices in the industry, has improved business ethics to the individual and collective benefit of all producers, and has been of value in establishing an opportunity for independent handling of the problems of ready-mixed concrete in each community. It is also believed, stated Mr. Thomson, that the ready-mixed code and the codes of related industries have been responsible for firmer market prices than would otherwise have been the case with the very limited volume of construction business last year.

The association proposes to sponsor a series of studies of the technical problems which face producers. These investigations will be under the supervision of a small but representative Technical Problems Committee under the chairmanship of R. B. Young. Mr. Thomson also stressed the necessity of continued coöperation with other organizations, both technical and commercial. A ready-mixed-concrete operation, he stated, is a unique combination of the features of manufacturing, jobbing, transportation, and service and its product is perishable, made-to-order, and is delivered exactly at the time and rate named by the customer. All of these functions, in his opinion, are worthless unless the quality of the product is maintained, hence the manufacture of the concrete is the underlying function and the others are accessory. Adequate provisions, therefore, are necessary for capable manufacturing control and supervision.

R. B. Young, vice president of the association and chief engineer of Ontario Ready Mix Concrete, Ltd., Toronto, Ont., in his address, *Technical Problems and Association Research in the Field of Ready Mixed Concrete*, outlined many of the important problems confronting the ready-mixed-concrete manufacturer and which it is the function of the Technical Problems Committee to review, to select the most urgent, and to find the means for getting the needed information. Much of this information can be obtained through coöperation with others engaged in concrete research so as to avoid adding to the duplication of effort in this field.

According to Mr. Young an immediate need of the industry is a method for measuring the volume of concrete as delivered. The method of absolute volume now in use has been found to be inaccurate with certain types of mixtures. A quick test to determine the quality of concrete delivered, he said, would also be valuable to both users and producers of ready-mixed concrete and much remains to be learned about the proper factors of safety to apply in designing concrete of guaranteed strength. Education of its customers on the interpretation of field test data is also important for the protection of producers, many of whom have been put to great expense through lack of such knowledge on the part of engineers, architects, etc.

According to Mr. Young much remains to be learned of the comparison between the various important properties of job-mixed and ready-mixed concretes. A thorough study of the economics of ready-mixed concrete is also needed to justify its use. He also stated that many problems connected with winter operation also require satisfactory solutions. Uniformity in quality is also important as many purchasers judge the concrete on this basis alone and there is a fertile field for study in the problem of preventing or reducing the tendency of freshly-mixed concrete to segregate.

Much also remains to be learned of admixtures, said Mr. Young, and there is a surprising lack of knowledge of the design of concrete mixes even among those who should know. The latter situation is unnecessary because there are available methods of designing concrete mixes which are so simple as to be readily understood by the least technically minded. The test data obtained from day to day, he said, can also be used to maintain a close check on the plant designs and to demonstrate the sufficiency of the proportions used. Much study of the various methods of determining workability also remains to be done. Special cements and aggregates, said Mr. Young, have introduced new problems in the design of concrete mixes and data to permit any individual to accurately design concrete made of these materials is needed.

In closing Mr. Young said that the Technical Problems Committee is, first of all, a planning committee. One of its duties is to select from the many problems confronting the industry those that seem most urgent and whose solution will benefit the greatest number. It must also consider the best means for advancing knowledge of these problems, whether within the industry or by assistance from some established research agency such as the A.S.T.M., the A.C.I., etc. He said that the committee is also a clearing house for ideas and suggestions from producers, criticisms, etc., in which coöperation by association members is essential to success in obtaining results. Mr. Young also

NATIONAL READY MIXED CONCRETE ASSOCIATION

1935

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Washington, D. C.

stressed the importance of members conducting investigations in their own plants even if they are simple in scope and easily carried out. Results of such investigations, he said, are often as important as those obtained from the larger and more spectacular investigations which are hailed as "outstanding achievements," and the sum total of many related observations from different sources are exceedingly useful in checking the practicability of conclusions made.

Next on the program was a series of brief discussions of business conditions during the past year and of present and future prospects. Paul P. Bird, president of the Boston Sand & Gravel Co., Boston, Mass., said that reports on business conditions would probably parallel closely those given before the aggregate associations. He said that in the New England area, particularly Metropolitan Boston, the low point in both volume and price was reached in 1933. The year 1934 showed considerable improvement due mainly to jobs financed by public funds. Private construction remained low but showed a pickup in the last quarter of 1934 which, according to Mr. Bird, justifies optimism concerning 1935. Codes, he said, have been of great help in bringing about a more friendly and coöperative spirit among producers.

J. E. Burke, J. K. Davison & Bros., Pittsburgh, Pa., said that the volume of business in that area showed a slight improvement and that prices had held up well during the entire depression period. Judging from work already in sight he expected a sharp improvement for this year. The code, according to Mr. Burke, has been of some help but a healthy competitive spirit already existed in this area before the code went into effect. He indorsed the importance of coöperation on technical problems suggested by Mr. Young and said that increasing the membership of the association to include all of the members of the industry would be of great help in this and other work.

J. E. Donelson, Sloss Sheffield Steel & Iron Co., Birmingham, Ala., said that in his area business reached an extremely low level in 1933 but improved sharply in 1934. Prospects for 1935, he said, are very encouraging, due chiefly to government funds.

George W. Gauntlett, president of the Pioneer Sand & Gravel Co., Seattle, Wash., said that business improved about 25 per cent. over 1933, due largely to work financed with federal funds. Prices have held up well but conditions are such that ready-mixed concrete is merely a medium for selling aggregates and producers are satisfied to get the cost of mixing.

J. L. Shiely, president of the J. L. Shiely Co., St. Paul, Minn., had little to say about business conditions. He did, however, state that winter business has been found to be highly profitable as job-mixed concrete is impractical, especially in sub-zero weather. In his opinion the future will see producing facilities broken up into smaller units.

The first speaker at the ready-mixed concrete meeting on Friday morning, presided over by R. B. Young, was F. R. McMillan, director of research, Portland Cement Assn., who discussed "Trends in Cement Specifications." He devoted his paper mainly to the various types of special cements which have been used in the larger government construction projects and the reasons for their use. Boulder Dam specifications, said Mr. McMillan, were for a low-heat cement with necessarily accompanying slow-hardening characteristics. Heat control was achieved by control of the tricalcium aluminates and silicates. In winter the rate of hardening is increased by mixing with standard cement. San Francisco Bay Bridge specifications limited the tricalcium aluminate content to increase resistance to the action of sea water. On other projects, said Mr. McMillan, admixtures of lime, trass cements and other materials were used and in one case a more coarsely ground cement than standard was specified. At the Fort Peck dam tunnels were built with cement containing a controlled ratio of aluminate to iron oxide for resistance to alkaline water. In his opinion all special cements can be brought under a single specification, thus adding only one specification to those existing for standard and high-early-strength cements.

F. E. Richart, research professor of engineering at the University of Illinois, spoke on *The Economics of High Quality Concrete in Reinforced Concrete Structures.* He brought out the fact that while the use of higher-strength concrete in construction work reduces the volume of business for a particular project this factor would be offset by an increase in the number of projects due to the lowered cost of construction. He quoted figures to illustrate the fact that the unit cost of concrete does not increase as rapidly as the strength and also showed figures on the amounts of concrete of various strengths required for the same purpose.

An open forum was then held on the development in equipment for the ready-mixed-concrete industry. P. F. Ayer, Boston Sand & Gravel Co., said that there is a tendency in big cities to 4- to 5-cu.yd. loads on 3-axle trucks. B. F. Devine, Chain Belt Co., gave a brief but interesting discussion of the use of pumps in the handling and placing of concrete. Lion Gardiner, Jaeger Machine Co., brought out some of the improvements that have been made in truck mixers and agitators. He also pointed out that truck mixers have been successfully used for mixing and placing bituminized aggregates and said that this opened a new field to producers.

A. A. Levison, Blaw Knox Co., commented on modern batching methods and the economy of accurate batching and described various types of automatic batchers and their applications.

H. F. Thomson touched briefly on new developments in the industry, especially the trend toward portability of batching equipment to reach outlying jobs. Mr. Thomson then gave the annual report of the board of directors of the association.

The nominating committee recommendations were then read and the officers for the coming year elected.

The Friday afternoon meeting, presided over by J. E. Burke, was opened with reports of the execu-

(*Continued on page 52*)

The gravel plant with locomotive and cars. Elevator from track hopper at left and car-loading conveyor at right.

The 2½-cu.yd. Diesel dragline loading to 20-cu.yd. dump cars. The 75-ton steam locomotive is visible at left.

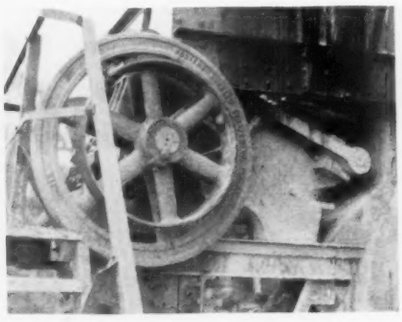
Extra-Capacity Equipment Features New Gravel Plant Near Fort Worth

AN interesting recent development in the sand-and-gravel industry was the completion of a new plant in February, 1934, by H. T. Farrell at Dorothy, Tex. This plant has a capacity of about 100 tons per hr. and is notable for its simplicity and economy of operation as well as for the fact that no provisions are made for material storage other than in stock-piles. The plant and property are located near Trinity River, 1 mi. east of Tarrant, Tex., and about midway between Dallas and Fort Worth. Many other plants are located in this river's flood plain, which is the chief source of aggregate supply in that section. Mr. Farrell was formerly a prominent railroad contractor. He plans, it is rumored, to increase the capacity of his operations in the near future.

An extensive deposit of gravel is being worked at the present plant site and an additional 90 acres is held for future development, from which trees and undergrowth are being cleared. The gravel bed is from 12 to 15 ft. in thickness and the overburden averages 7 ft. in depth. The deposit varies from 30 to 60 per cent. sand with an average of 40 per cent. and little of the gravel is over 3 in. in size. Stripping is done by a Bucyrus-Erie 52B drag-line equipped with a 2½-cu.yd. bucket of the same make. This machine is powered by an Atlas-Imperial Diesel engine. Ordinarily the overburden is overcast into the worked-out section of the pit but at the time the plant was visited it was being loaded into cars and used by the C. R. I. & P. Ry. for fill for bridges, track-widening and other improvements.

The same drag-line excavates the gravel and loads it into four 20-cu.yd. Western steel, air-operated, side-dump cars which are hauled by a Baldwin 75½-ton steam locomotive. Gravel is discharged from the cars into a 75-cu.yd. concrete track hopper which has a rail grizzly to eliminate oversize material. A Jeffrey pan feeder takes the material from the hopper and discharges it into a chain-bucket elevator of the same make. Sizing is done by a 4-ft. by 24-ft. Jeffrey revolving screen which has a baffled scrubber section and an outer jacket. Perforated-metal screen plate is used. The gravel over 1¾ in. in size is fed to a Western Wheeled Scraper Co. jaw crusher, the product of which is loaded direct into cars through a perforated chute which removes the fines. The three sizes of gravel produced can be

The revolving sizing screen with sand jacket and chain drive at right.



The jaw reduction crusher with spout from screen at upper right.

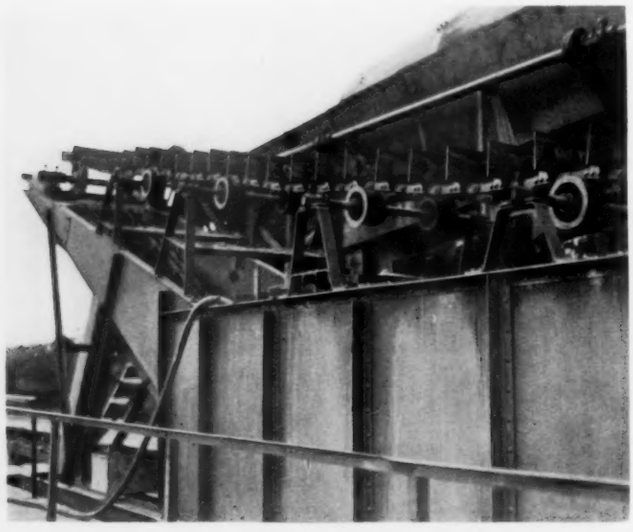
The 2-cyl. Diesel engine with air tank at left and cooling tower.

A plant view showing the compact arrangement of screen, crusher, sand-drag box, etc.

loaded together through a chute direct into cars, or two sizes can be fed to two parallel belt-conveyors feeding chutes so that each of the three sizes is loaded into a separate car. The sand from the revolving screen goes by gravity to a Jeffrey sand-drag box from which the extreme fines and the waste water are flumed into a worked-out section of the pit. Sand is fed to a horizontal belt-conveyor for loading into cars.

Railroad cars are spotted for loading and are switched by the same Baldwin locomotive which hauls the dump cars. A 1½-mi. track connects the plant with the C. R. I. & P. Ry. over which all shipments are made. This track connection alone represents a considerable investment due to the heavy fill which is 15 to 20 ft. deep in some places. A number of concrete culverts and a long steel truss bridge across Trinity River were also built.

The power for the entire plant is furnished by a 110-hp. Fairbanks-Morse 2-cyl. horizontal Diesel engine, which drives a line-shaft by a belt. The individual machines are driven by belt or chain drives from this shaft, which has a clutch that can be operated by hand. A 6-in. Fairbanks-Morse centrifugal pump driven from this shaft furnishes water for washing the product and a small generator furnishes light for night operation. A small tower cools the engine-cooling water, which is supplied by another centrifugal pump. The Diesel engine is started by compressed air which is stored in two tanks and is supplied by a small Fairbanks-Morse compressor driven by a gasoline engine of the same make. Most of the equipment for this plant was supplied by the Jeffrey Manufacturing Co. All the conveyor belting was supplied by the Republic Rubber Co.



The sand-drag box with revolving screen at right and loading conveyor at left.

Premixed Concrete (from page 50)

tive staff of the association. Stanton Walker briefly outlined the history of the code and the manner in which the code-writing committee became the Code Authority by provision of the code. Geo. A. Smith brought out the fact that 15 marketing areas have been approved and that six of these are operating under the open price policy.

A series of brief discussions of the establishment and organization of marketing areas followed. Porter Yett, City Motor Trucking Co., Portland, Ore., in his discussion of marketing areas in the Northwest mentioned the use of ready-mixed concrete on preliminary construction at the Bonneville Dam. A portable batching plant is used. P. F. Ayer opened the discussion on operation of the open-price policy with the statement that it had been quite helpful in his area. H. F. Thomson raised a question to which Irving R. Saum replied that except in special cases a producer of ready-mixed concrete is regarded as a manufacturer of a material and not as a sub-contractor.

A. W. Bendig described the base price system in use in the Pittsburgh area where the base price is charged on quantities of from 2 to 15 cu.yd.; a $1.00 discount is given on quantities of 15 to 50 cu.yd.; and $2.00 on amounts of over 50 cu.yd.

R. Campbell Starr, of the aggregate code authority staff, was then called on and stated that observance of uniform terms of sale and credit practices are necessary for the correct operation of the open-price policy. Rules for 17 districts have already been approved and 28 are pending.

As this meeting was concluded ahead of schedule it was decided to continue with the program scheduled for Friday evening. P. F. Ayer presided. G. C. Bannerman of the aggregates code-authority staff spoke on trade-practice compliance. He stated that the removal of the Blue Eagle from concerns violating code provisions had been effective in bringing about compliance chiefly because of the dependence of producers on federal funds for a large share of their business. Mr. Saum outlined the methods used in investigating trade-practice complaints and submitting them to the code authority without revealing the identity of complainant or defendant.

Aggregates Code (from page 33)

Gibson, Minneapolis, Minn., stated that producers in his region are well satisfied with the open-price policy but that havoc has been created by Executive Order 6767, which permits a 15 per cent. leeway when bidding on government work. Mr. Ahearn agreed that this order had abrogated the open-price policy to some extent but this effect had been softened by a ruling obtained through the efforts of Mr. Graves, which said that the order could have effect only in direct sales to divisions and subdivisions of government. A contractor who has secured a governmental contract is himself not entitled to this discount, said Mr. Ahearn. He also said that efforts are being made by code authorities to have this order abrogated and that there was every reason to believe that these efforts would meet with success.

P. J. Kremer (Buffalo Slag Co., Buffalo, N. Y.) elicited from Chairman Rarey the statement that railroad ballast and mineral filler came under the open-price policy at the discretion of the various district committees. Regardless of policy in this matter, he said, code assessments apply to these products as well as to other tonnage produced. Considerable discussion then ensued on the conditions under which prices can be filed under the open-price policy and how field prices can be met. Mr. Ahearn stated that there is no official opinion as to whether the five-day time lag on filed prices also applies to cancellations of filed prices and that each district must handle that problem in the light of its own experience and judgment. In answer to a question by E. Guy Sutton (Neal Gravel Co., Mattoon, Ill.), Mr. Rarey said that filing of delivered prices need not specify the location of a plant but that when plant prices are filed locations should be given, whether the plant be permanent or portable. In his opinion there is no restriction on the origin of material on which delivered prices have been filed. A crushed-stone producer can meet the filed price of a gravel producer and vice versa, providing both materials meet the specifications of the job.

J. R. Boyd assumed the chair for the discussion of cost accounting, budgets and finance. Mr. Boyd pointed out that a costing committee in consultation with Ernst & Ernst prepared cost accounting systems for these industries which are now before the administration for approval along with about 60 other systems of other codes. When approved pamphlets will be distributed to all members of the industries. Some discussion on the auditing of local district accounts followed. Assessments for code enforcement were also discussed, along with the present and proposed methods of collection. Mr. Boyd stated that over 70 per cent. of booked assessments have been collected.

Henry Dolese (Dolese Bros. Co., Chicago, Ill.), raised a question regarding chat production, which was answered by Mr. Ahearn with the statement that any members or group of members of these industries can present to the Code Authority or its Executive Committee or Council facts and circumstances which justify a departure from the arbitrary application of Code Authority dues with the assurance that the merits of the case will receive full consideration.

The Tuesday evening joint meeting was opened by Chairman H. V. Owens (Eastern Rock Products, Inc., Utica, N. Y.). Stanton Walker briefly reviewed developments with regard to "permissive" areas which had been approved for California, Missouri, Colorado, Connecticut and part of Ohio. The actions of the Administration in approving and renewing these proposals, he said, gave little indication as to future policies. In answer to a request E. J. Goodpastor (Northern District, Region 15, San Francisco, Cal.) said that one of the many things the approval of "permissive" areas has done is to eliminate price chiseling by contractors on the threat of putting in their own plants. Carl Hise (Region 13, Kansas City, Mo.) said that producers in that region had benefited by it and wanted an approval of its extension. H. H. Brandon said that in Ohio considerable benefit resulted to producers. An accurate definition by the Administration of what is meant by "economic availiability," it was agreed by all, would very much simplify the procedure of developing information for these areas.

R. J. Potts (Potts-Moore Gravel Co., Waco, Tex.) warned against a common tendency on the part of producers to confuse the open-price policy with price fixing, which is distasteful to the Administration and the public. There also is nothing in the code for these industries which can be called production control, he said. Mr. Blake said that production control of a sort had been practiced in California by requiring that a contractor, when given a permit to erect a plant for a specific job, agree that the plant cease operating when that job is completed.

A. T. Goldbeck (National Crushed Stone Assn., Washington, D. C.) was then called upon to present data which has been compiled on hours of labor and rates of pay. He pointed out that the increase in employment in May and June of 1934 over the same months of 1933 amounted to 34 per cent. and the increased total income amounts to 43 per cent. This, he said, shows that rates of pay were also increased. Hours worked per week during the first half of 1934 averaged close to the 40 hr. maximum permitted by the code. Considerable protest was made by producers present of the injustice being done to both producers and their employees through the imposition of a 40-hr. week. Mr. Ahearn then advised against attempts to get these limits increased, as the Administration would certainly decrease them were the code reopened. There is a grave possibility, he said, that all code provisions will be superseded by a 30-hr. week. The balance of the meeting was devoted to general discussion, mostly on hours of labor and rates of pay.

Producers of crushed stone, sand and gravel and slag reassembled Thursday afternoon for a joint session, the two most important topics of which were an address, "The Status of Code Enforcement," by Wm. H. Davis, former Director of Compliance for the N.R.A., and another, "One Way to Industrial Stability," delivered by Edward J. Mehren, president of the Portland Cement Assn.

Mr. Davis reported that there has been a high degree of compliance in the case of all codes and this despite the fact that the N.R.A. had no powers to enforce compliance. He pointed out that the duty and power to enforce compliance rests either with United States attorneys through the process of injunction and the other through the Interstate Commerce Commission under the National Industrial Recovery Act. He reminded his hearers that a law is merely a translated custom, that customary methods of doing things must be deflected into new channels and that until the change has been made those who fail or refuse to coöperate can not be called law breakers. He expressed his idea of economic liberty by saying that he has the right to determine the conditions under which he makes his own living by the exercise of his own choice, and he objects to interference by government except in cases wherein it can be shown that the public good is affected. He explained that industry needed really more than the right to agree, which is provided by various codes, that it needed the right to compel the minority to accept the practices and standards set up by the majority.

Defendants who have been charged with code violations have pleaded three different objections: (1) The unconstitutionality of the National Industrial Recovery Act; (2) the allegation that the delegation of authority to the administrator had exceeded the powers of Congress; (3) the allegation that the business involved was not interstate commerce and that Congress had nothing to do with it. None of these has been decided. The Belcher case, which may be decided in April, will involve the first decision of the Supreme Court on these fundamental questions. Mr. Davis said that he had suggested, on request, a plan of enforcement which would divorce the N.R.A. of all attempts at enforcement. He recommended, for example, that labor problems be referred to a labor code enforcement service which would act in a capacity similar to that of factory inspectors and who would have no discretion, no judicial function and no duty except finding out the facts regarding violations in order that they may be referred to the district attorney. He proposed that, with respect to fair trade practices, each industry should be made individually responsible for compliance, the N.R.A. opening and keeping open the channels of enforcement leading to the district attorney's office. His plan would make available to district attorneys the services of the N.R.A.'s specially-trained lawyers of the litigation division and would decentralize enforcement by depending on local enforcement.

As a result of his investigation, cases have been classified into two groups: (1) Those violations of provisions which forbid practices generally recognized as evil in themselves or which violate accepted laws; (2) cases involving the adjudication of code provisions. He declared that, although thirty cases have been selected to fall within Group 2, there are not thirty legal cases involved in the N.R.A. He added that, if the National Industrial Recovery Act should be declared constitutional and if it should be decided that the President's authority under it is not excessive, then enforcement can proceed. He said that the Federal Trade Provision Act provides almost perfect procedure and staff for adjudicating cases of unfair competition. The National Industrial Recovery Act places violation of trade practice provisions within the jurisdiction of the trade commission, which is keen to examine its proper place in adjudicating them. Violations occurring in intra-state business can be adjudicated in those states having state N.R.A. enforcement laws. Most state legislatures are considering the passage of such legislation.

The spirit in which Mr. Mehren's plea for higher ethical standards in business was received indicated that he struck a responsive cord. After deploring as what he termed the failures of the Federal Trade Commission to enforce trade practice provisions, he pointed out the fact that the profitless prosperity of which business has complained is due largely to the breakdown in ethical trade practices. He said that the price warfare which prevailed throughout industry had depleted the surpluses which had been built up through years of efficient management. The shortsighted selfishness and lack of consideration for the welfare of others and a concentration of interest on temporary gains resulting from the violation of ethical trade practices had wiped out all previous gains. He asserted that the old conditions involving price warfare and its destructive results must not return. He contended that the competition is not the cause of industrial troubles but the breakdown of self-discipline when it was most needed.

In closing, he said, "If self-discipline in industry breaks down, if the present codes fail, if there is no self-imposed discipline, and the resulting vigorous industrial opinion supporting them, then I see no alternative but periodical recurrent wars. . . . It is part of my philosophy that principles violated bring, over a period of time, their own punishment, their own punitive discipline. We have three possible disciplines: Self-discipline, which is preventive in character; code discipline, or some similar discipline, which is corrective; and industrial warfare, which is punitive. One or more of them will be applied, it is certain, but only the first can surely lead to industrial stability and industrial peace."

The joint banquet of the three associations was held Thursday evening and as usual was well attended. The guest speaker of the evening was Col. Willard T. Chevalier who first paid tribute to the members of the industry and their code representatives for their loyal and coöperative spirit in meeting the problems of the past few years. He then classified the problems of industry into two groups: internal problems having to do with the administration of the industry; and external problems that have to do with the markets and with the conditions that govern the demand and sale of the products of that industry. During the period from 1924 to 1929, he said, little thought was given to either problem which is the reason why we have so many problems now.

In the last two or three years, said Col. Chevalier, we concentrated on the internal problems of our industry but we have now come to a period of reaction and wonder if the trouble we have gone to with the code has been worth while. He referred to codes as but a symbol indicating a trend which will outlive all the codes and, regardless of what becomes of them, their underlying spirit will remain.

According to Col. Chevalier we have had regimentation in American industry for a long time, beginning with the establishment of the first business corporation. Our problem, he said, is to keep the measure of regimentation within due bounds toward the needs of the problems that we have to meet. The one great reform necessary, in his opinion, is to make this order safer for the producers and less safe for the exploiters with less premium put on the acquisition of wealth at the expense of the creation of wealth. When these reforms are made there will be no need for the N.R.A. or any other such body. He warned that any tendency of industry to relapse to the predatory stage will result in a loss of its freedom.

Col. Chevalier stated that in his opinion two things that will not survive in the codes are price fixing and restrictions upon the freedom of investment of capital in business as these strike at fundamental principles of the American ideal of living.

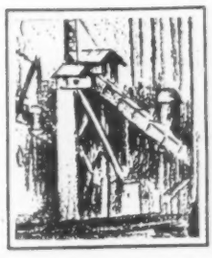
The country is nowhere near the end of its capital investment period of development, said Col. Chevalier, and we have not yet scratched the surface of the purely material development of this country. A tremendous demand for goods, services and new construction has been dammed up for five years and has accumulated a pressure that is bound to break loose. A beneficial result of the depression, he said, is the growing coöperation of all the elements involved in this industry. In closing he said that the time has now come to simplify codes to the point of absolute need and get down to the job of selling our goods.

Another feature of the evening was the presentation of safety awards by Dr. W. W. Adams of the U. S. Bureau of Mines. The Inland Lime & Stone Co., Manistique, Mich., won first award in the crushed stone industry. The Van Schuyler plant of the Warner Co., Morrisville, Pa., shared first honors in the sand-and-gravel industry with the American Aggregates Corp., Oxford, Mich. A long list of producers were also awarded honorable mention certificates.

MEN OF THE INDUSTRY

O. N. STEVENS

O. N. STEVENS is operating vice-president of the Southern Alkali Corp., which was formed in 1931 by the American Cyanamid Co. and the Pittsburgh Plate Glass Co. to supply them with alkali. This new company on September 1, 1934, put into operation a huge new alkali plant at Corpus Christi, Tex. Mr. Stevens, although only 52 years of age, has spent the past 27 years in the alkali business. After leaving the University of Kansas he designed Corliss engines for the Murray Iron Works and went into the alkali business. He was connected with the Solvay Process Co. until 1923. Before the building of this new plant he was assistant to H. A. Galt, president of the Columbia Alkali Corp., and the Columbia Cement Corp., both subsidiaries of the Pittsburgh Plate Glass Co.



Personal Mention

Edwin K. Borchard has been appointed technical manager by the Keystone Portland Cement Co. with offices in Philadelphia, New York and Boston. Mr. Borchard has been associated with the Universal Atlas Cement Co., as technical service manager, and for many years with the Atlas Portland Cement Co. and the Portland Cement Assn. in technical and publicity work.

Stuart L. Rawlings, active head of the Calaveras Cement Co. of California, has been elected to the directorate of the Bank of California.

R. T. Gow, district manager at Tulsa, Okla., for the Monarch Cement Co., was recently elected potentate of Akdar Temple, Order of the Mystic Shrine, at Tulsa.

J. M. Breen of Canada Cement Co., Ltd., has been transferred from Toronto to Montreal to assume the position of chief of the cement company's technical staff. Mr. Breen was graduated from the engineering school of the University of Toronto in 1912 and served for a time with the Toronto Harbor Commission. In 1922 he entered the employ of Canada Cement Co., Ltd., as an engineer at the Toronto offices.

William J. Stewart, sales manager of the Stewart Sand & Material Co., of Kansas City, Mo., has been chosen vice-president of the Builders' Assn. of Kansas City.

William L. Hartley, heretofore manager of Detroit office of Link-Belt Co., has been named manager of foundry equipment sales, with headquarters in Chicago. **Harold L. Hoefman,** formerly manager of the company's Indianapolis branch, succeeds Mr. Hartley as manager of Detroit office.

A. H. Skaer has been placed in charge of the Cochise Rock Drill Manufacturing Co., a subsidiary of the Independent Pneumatic Tool Co. Mr. Skaer was formerly associated with the Denver Rock Drill Manufacturing Co. and for many years was its president. He will make his headquarters in Los Angeles where the Cochise plant is located.

W. R. Heckendorn, former district sales manager, Boston, has been promoted to assistant sales manager, New York, by Universal Atlas Cement Co. He has been with the company since 1923. Prior to that time he was with the American Telephone & Telegraph Co. and the Portland Cement Assn. **H. F. Van Wagner,** district sales manager, Newark, is transferred to Boston where he will serve in the same capacity. He joined Universal Atlas early in 1917. Prior to his cement connection he was salesman for the American Steel & Wire Co., another subsidiary of the U. S. Steel Corp.

Don G. Furlong has been appointed to the position of district sales manager of the Federal Motor Truck Co., Detroit, Mich. Mr. Furlong will cover the Ohio territory where he is well acquainted with the trade. He was previously connected with the Ford Motor Co. and later with the Thornton Tandem Co., Detroit, Mich.

A. E. Fielding and **Sam Wettlaufer** operating as the Screen Equipment Co., 9-11 LaFayette Ave., Buffalo, N. Y., are now representing Productive Eqpt. Corp., in western New York State.

John A. Robinson, formerly in charge of the Dallas, Tex., office of The Timken Roller Bearing Co., has been transferred to the Automotive Division and appointed District Manager of that division with headquarters at the Chicago office, 2534 South Michigan Ave. **H. W. Trump** has been promoted to District Manager of the Industrial Division of the Timken company with headquarters at Dallas, Tex.

Arthur A. Davis, 821 West 31st St., Indianapolis, Ind., has been appointed representative in that area for the Wisconsin Foundry & Machine Co.

Paul J. Rutan, has been appointed district sales manager of the Rochester, N. Y., office of the Pennsylvania-Dixie Cement Corp., succeeding **H. C. Carpenter,** who has been transferred to general sales in New York.

G. Frank Sterne, head of the firm of Canada Silicates Ltd., Brantford, Ont., was recently chosen as vice-president of the Brantford Kiwanis Club for 1935.

A. B. Jacobus, for the past several years manager of general scale sales in the Chicago office of Fairbanks, Morse & Co., has been made general manager of E. & T. Fairbanks & Co. at St. Johnsbury, Vt. **George C. Worthley,** formerly manager of the scale department in the New York branch, has been transferred to Chicago to fill the vacancy caused by the transfer of Mr. Jacobus.

Ralph H. Clore has been named general sales manager, effective February 1, of the Medart Co., St. Louis, makers of power-transmission machines. Mr. Clore, formerly general sales manager of the United States Electrical Tool Co., succeeds F. P. Kohlbry, who has resigned to assume active charge of the Machinery and Welder Corp. of Chicago.

Obituary

N. A. Kelly.

N. A. Kelly, sales manager at New York of Universal Atlas Cement Co., died Jan. 16 at his home in Forest Hills, L. I. He was born in Pittsburgh, May 4, 1884. With a valuable background in construction work, Mr. Kelly, on October 6, 1911, joined the Universal Atlas organization as salesman, Pittsburgh, and spent nearly half his life with that company. On December 13, 1915, he was appointed division sales manager, Pittsburgh, and on January 1, 1919, was transferred to New York where he served in the same capacity. On November 15, 1928, he became sales manager. A. O. Stark, formerly assistant sales manager at New York, has replaced Mr. Kelly.

A. C. Kreitzer, vice-president of the Monarch Cement Co., of Humboldt, Kan., died last month at his home in Wichita, Kan., after a short illness. He had, however, been in failing health for some time. He had been vice-president of the Monarch organization since 1913. He is survived by two daughters and the widow. Burial took place in Wichita. The death of Mr. Kreitzer is the second in the Monarch offices within a few months, H. F. G. Wulf, president, having died October 19, 1934.

Frank H. Shaw, secretary-treasurer of the Morris Limestone Products Co., Morris, Ill., has died.

David R. Bowen, vice-president of Farrel-Birmingham Co., Inc., and for 45 years its chief engineer, died at his home at Ansonia, Conn. Mr. Bowen was born in Wales, October 22, 1865. At the age of 17 he came to the United States with his parents and in 1883 entered the employ of the Farrel Foundry & Machine Co. as a machinist's apprentice, rising through the years to chief engineer, a position which he held until 1930, when he was elected vice-president, in charge of engineering.

John E. Russell, one of the directors and large shareholders of the Consolidated Sand & Gravel Co., Waterford, Ont., died recently from burns received in an oil explosion at Toronto. The estate, valued at $53,000, was left to the family of Mr. Russell.

Joseph C. Noll, 51, superintendent of the South Bend Sand & Gravel Co., South Bend, Ind., died suddenly of a heart attack January 29 at his home in South Bend. He was a native of Fort Wayne, Ind., coming to South Bend seven years ago after having spent a number of years in South America in engineering work.

Frank E. Clark, president and treasurer of the Bridgeport Stone Co., of Bridgeport, Conn., is dead. He was 76 years old.

Rudolph Nattkemper, 58, prominent in the sand-and-gravel industry in southern Indiana for thirty-five years, died recently at his home in Terre Haute, Ind. With his brother, Otto, he opened one of the first gravel pits in Vermillion County. The firm expanded and was later organized as the Terre Haute Sand & Gravel Co. Mr. Nattkemper was a native of the Hoosier state and is survived by the widow, two sons, four sisters and two brothers. Burial was at his birthplace, Riley, Ind.

▼ *Coming Events* ▲

March 4-8, 1935, Philadelphia, Pa.—Spring group meeting of standing committees, American Society for Testing Materials.

March 5-8, 1935, Wichita, Kan.—Eighth annual southwest road show and school.

June 24-28, 1935, Detroit, Mich.—Annual convention, American Society for Testing Materials, Book-Cadillac Hotel.

Latest Portland-Cement Statistics

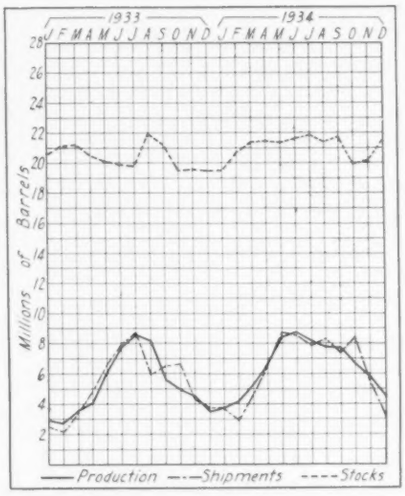


Chart showing monthly production, shipments and stocks on hand at end of month from January, 1933, to December, 1934.

THE Portland-cement industry in December, 1934, produced 4,447,000 bbl., shipped 3,104,000 bbl. from the mills, and had in stock at the end of the month 21,421,000 bbl. Production of Portland cement in December, 1934, showed an increase of 26.1 per cent. and shipments a decrease of 17.0 per cent., as compared with December, 1933. Portland-cement stocks at mills were 9.6 per cent. higher than a year ago. The preliminary totals for 1934 show increases of 22.4 per cent. in production and 18.1 per cent. in shipments from the final totals for 1933.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 162 plants at the close of December, 1934, and of 163 plants at the close of December, 1933.

RATIO (*per cent.*) OF PRODUCTION TO CAPACITY

	December		Nov.	Oct.	Sept.
	1933	1934	1934	1934	1934
The month	15.5	19.5	26.2	29.3	34.8
The 12 months ended	23.6	29.0	28.7	28.3	27.6

Rubber Company's Booth Popular at Convention

One of the most popular centers of attention at the Joint Exposition of the crushed-stone, sand-and-gravel and slag industries, held at the Palmer House, Chicago, January 28 to 31, was the booth of the Self-Vulcanizing Rubber Co., Chicago. This company manufactures Selfvulc, a self-curing plastic rubber compound for use in repairing worn conveyor belts and for lining chutes, hoppers, agitators and classifiers. It is also employed for covering pipes, cables and surfaces exposed to wear in flumes, centrifugal pumps, tube-mills, dredging equipment, air-separators, fans and other equipment exposed to abrasion. The interest shown in its products was increased by the necessity which producers face under present operating conditions of salvaging as far as possible their partly-used equipment and of reducing in every practical way the normal wear to which all their equipment is subjected.

A view of the company's booth appears on page 42 of this issue.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1933 AND 1934 (*In thousands of barrels*)

Month	Production		Shipments		Stocks At End of Month	
	1933	1934	1933	1934	1933	1934
January	2,958	3,779	2,502	3,778	20,624	19,547
February	2,777	4,168	2,278	2,952	21,125	20,762
March	3,684	5,257	3,510	4,618	21,298	21,422
April	4,183	6,544	4,949	6,492	20,542	21,557
May	6,262	8,554	6,709	8,784	20,117	21,301
June	7,804	8,813	7,979	8,541	19,936	21,600
July	8,609	8,144	8,697	7,898	19,848	21,852
August	8,223	7,842	5,994	8,249	22,078	21,424
September	5,638	7,680	6,517	7,388	21,216	21,734
October	5,037	6,675	6,750	8,439	19,502	19,972
November	4,672	5,779	4,463	5,674	19,709	20,078
December	3,526	4,447	3,738	3,104	19,541	21,421
Totals	63,373	77,682	64,086	75,917		

DISTRIBUTION OF CEMENT[1]

Shipped to—	November		December		Shipped to—	November		December	
	1933	1934	1933	1934		1933	1934	1933	1934
Alabama	57,406	100,205	100,482	76,703	New Mexico	14,856	24,708	16,139	20,656
Alaska	396	318	0	0	New York	401,337	636,979	232,319	310,852
Arizona	11,354	17,453	20,199	15,965	North Carolina	44,302	67,811	45,077	30,994
Arkansas	88,694	58,709	58,402	52,6599	North Dakota	2,410	8,952	3,978	3,129
California	419,096	421,240	373,141	339,721	Ohio	168,128	249,688	140,350	119,446
Colorado	27,782	45,572	24,420	24,234	Oklahoma	104,154	71,507	100,657	70,971
Connecticut	71,218	77,344	25,078	31,618	Oregon	19,693	57,224	19,686	49,967
Delaware	18,440	31,859	13,800	10,040	Pennsylvania	216,593	357,660	162,376	173,159
Dist. of Col	75,016	75,082	36,781	47,067	Puerto Rico	7,808	15,393	11,605	15,331
Florida	52,151	63,706	63,941	58,371	Rhode Island	16,662	24,040	9,852	10,966
Georgia	88,522	74,897	50,585	33,520	South Carolina	19,739	31,610	17,848	23,153
Hawaii	10,745	23,181	11,989	19,938	South Dakota	16,238	22,811	9,320	6,202
Idaho	10,378	15,797	7,355	6,706	Tennessee	70,401	141,735	82,777	120,388
Illinois	295,027	476,070	309,726	158,940	Texas	224,131	198,986	217,494	173,229
Indiana	119,603	121,787	94,689	38,360	Utah	23,162	28,493	7,313	6,705
Iowa	62,921	142,128	40,874	30,933	Vermont	10,846	13,972	3,461	3,421
Kansas	85,377	94,229	69,184	45,163	Virginia	64,199	91,825	68,082	46,336
Kentucky	93,265	92,442	73,566	42,499	Washington	53,916	50,160	36,412	41,296
Louisiana	85,479	49,574	96,860	40,856	West Virginia	45,933	91,613	42,747	47,136
Maine	12,816	17,148	6,692	6,971	Wisconsin	75,277	119,096	64,003	28,743
Maryland	70,027	104,750	64,611	58,301	Wyoming	7,166	10,982	6,348	9,551
Massachusetts	106,951	192,924	70,212	77,054	Unspecified	5,314	2,460	1,115	3,165
Michigan	106,952	160,379	120,573	65,426		4,418,776	5,638,526	3,653,348	3,045,195
Minnesota	51,638	78,034	36,845	25,061					
Mississippi	63,345	73,138	49,759	29,029	Foreign countries	44,224	35,474	84,652	58,805
Missouri	299,324	220,636	157,835	70,636					
Montana	11,216	27,265	10,743	34,499					
Nebraska	56,758	84,595	22,509	19,590					
Nevada	187,014	185,775	227,041	173,335	Total shipped from cement plants	4,463,000	5,674,000	3,738,000	3,104,000
New Hampshire	18,790	19,935	7,448	10,051					
New Jersey	148,810	174,649	109,049	87,153					

[1] Includes estimated distribution of shipments from 1 plant in December, 1934; from 2 plants in November, 1933 and 1934 and in December, 1933.

NEW CORPORATIONS

THE WASHOUGAL RIVER GRAVEL CO., Camas, Wash. Capital stock $5,000. Incorporators, E. M. Ahols, Chester W. Tidland, and H. B. Tidland.

THE DIXIE PHOSPHATE CO., Ocala, Fla. Incorporators, Dawson White and A. W. Higgins.

THE SUPERIOR PHOSPHATE CO., Dunnellon, Fla. Chartered in Dunnellon, Fla., by J. H. Roof and S. A. Doyle.

THE UNIVERSAL ROCK ASPHALT CO., Kansas City, Mo. Incorporators, James J. Downey, W. B. Long and others.

THE BURKEVILLE STONE CORP., Richmond, Va. Incorporators, C. S. Luck, 1617 Brooks Road, Richmond, and others. Capital $25,000.

THE LEON SAND & GRAVEL CO., San Antonio, Tex. Incorporators, Charles M. Schoenfeld, 324 Hunstock, San Antonio, Tex., and others.

EDWARD F. MCJENNA, INC., New Jersey, N. J. Organized to deal in stone. Capital $100,000. Agent, Jack G. Goldberg.

TENNESSEE MARBLE, INC., Knoxville, Tenn. Incorporators, Lucile P. Huffaker, M. W. Egerton, and James L. Clark, Jr. To quarry and finish marble.

Hard-Surfacing Gives Worn Equipment New Lease on Life

The rebuilding of worn-out quarry machinery by welding is playing a very important part in the maintenance of equipment that is subjected to severe abrasion. It is not only possible to replace the worn surfaces by welding but, if the proper procedure be followed, worn-out and useless equipment can be rebuilt and made to outlast new equipment in some cases by 100 to 200 per cent. This is true of crusher heads, such as worn-out crusher mantles made of chilled iron. It has been proved that chilled-iron crusher heads can be rebuilt with manganese steel and made to give service equal to that of a new manganese casting and many times that of the iron

(*Continued on page 60*)

Lime Shipments

October lime shipments were the largest since June, 1934, reaching 132,328 tons (Table I), and were well above the levels of the same month a year ago. Chemical lime accounted for 95,795 tons (or 72.7 per cent.) building lime for 28,039 tons (or 21.2 per cent.) and agricultural lime for 8,494 tons (or 6.1 per cent.).

With the exception of agricultural lime, an increase is noted in the other two types as compared with September. Agricultural-lime shipments dropped 36.8 per cent., a seasonal decline which may be expected, while lime for building uses jumped 30.3 per cent. above September and chemical-lime shipments were 16.9 per cent. ahead of the preceding month. The increase in building-lime shipments at this season of the year is heartening, since a falling off is usually experienced with the advent of colder weather. Chemical lime shipments maintained the steadiness they have shown throughout the year, with the curve slightly upward.

Prices were slightly better than in September (Table II). The average price of all limes for October was $7.71 as against $7.70 in the preceding month. The average price of agricultural lime showed a gain, being $8.77 for October as against $8.01 for September. Building lime declined from $10.85 to $10.75, while chemical lime prices also were, on the average, 10 c. a barrel lower, dropping to $6.73 from $6.83.

Quicklime shipped in bulk sold for $5.11 for agricultural purposes, $8.26 for building lime and $6.09 for chemical lime—the average bulk price being $6.18. These prices compare with $4.69, $8.19, $6.14, and $6.19, respectively, for the month of September. Those of quicklime shipped in barrels ranged from $17.60 for agricultural lime ($16.63 in September), to $17.14 for building lime ($17.13 in September) and to $16.71 for chemical lime (16.47 in September). Bagged quicklime sold as follows: agricultural, $9.06 ($8.89 in September), building, $12.10 ($12.51 in September), and chemical, $8.78 ($7.51 in September). Hydrate shipments averaged $8.94 per ton for agricultural lime ($8.38 in September), $9.07 for building lime

(*Continued on page 58*)

Table I.—SHIPMENTS OF LIME IN 1934, BY KINDS AND USES (*tons*)

Month	Kinds[1]	Uses			Totals
		Agriculture	Building	Chemical	
March	Quicklime	2,541	9,538	85,918	97,997
	Hydrate	9,695	10,570[2]	24,152	44,417
	Totals	12,236	20,108	110,070	142,414
April	Quicklime	5,945	12,531	75,187	93,663
	Hydrate	26,990	14,476[2]	20,722	62,188
	Totals	32,935	27,007	95,909	155,851
May	Quicklime	5,184	11,569	86,807	103,560
	Hydrate	26,392	14,560[2]	22,503	63,455
	Totals	31,576	26,129	109,310	167,015
June	Quicklime	1,555	11,314	71,170	84,039
	Hydrate	12,444	14,694	23,359	50,497
	Totals	13,999	26,008	94,529	134,536
July	Quicklime	855	10,422	63,713	74,990
	Hydrate	7,296	13,804	20,895	41,995
	Totals	8,151	24,226	84,608	116,985
August	Quicklime	4,683	12,151	63,809	80,643
	Hydrate	14,111	14,267	19,729	48,107
	Totals	18,794	26,418	83,538	128,750
September	Quicklime	3,126	10,052	61,156	74,334
	Hydrate	10,304	11,470	20,811	42,585
	Totals	13,430	21,522	81,967	116,919
October	Quicklime	1,840	12,748	73,767	88,355
	Hydrate	6,654	15,291	22,028	43,973
	Totals	8,494	28,039	95,795	132,328

[1] Do not include the following miscellaneous lime: March, 1,285 tons; April, 3,136 tons; May, 3,595 tons; June, 2,915 tons; July, 2,275 tons; August, 4,075 tons; September, 3,699 tons; October, 3,339 tons.
[2] Does not include finishing lime.

Tab'e II.—SHIPMENTS OF LIME IN OCTOBER, 1934, BY KINDS AND USES

Kinds	Agriculture		Building[2]		Chemical		Total	
	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton
Quicklime:								
In bulk	531	$5.11	3,548	$8.26	69,026	$6.09	73,105	$6.18
In barrels	47	17.60	4,364	17.14	751	16.71	5,162	17.08
In bags	1,262	9.06	4,836	12.10	3,990	8.78	10,008	10.41
Hydrate	6,654	8.94	15.291	9.07	22.028	8.04	43,973	8.54
Totals or averages	8,494	$8.77	28,039	$10.75	95,795	$6.73	132,328	$7.71

[1] Do not include 3,339 tons of miscellaneous lime. [2] Does not include finishing lime.

Table III.—SHIPMENTS AND VALUE OF LIME AND RATIO OF SHIPMENTS TO CAPACITY IN 1933 AND 1934, BY MONTHS

Month	Total Capacity of Concerns Reporting[1] (*tons*)	Shipments Reported (*tons*)	Average Value Per Ton	Ratio of Shipments to Capacity (*per cent.*)												
				United States	Districts											
					1	2	3	4	5B	6-8-9	7	10-11	12	13	14	15
1933																
November	392,947	100,596	$7.01	25.6	15.1	20.0	32.0	22.3	24.2	18.5	37.6	34.4	22.2	26.3	23.2	18.4
December	390,553	107,860	6.72	27.6	17.7	16.3	40.0	21.1	27.9	15.2	41.1	33.8	25.9	22.9	20.3	19.6
1934																
January	392,636	112,437	7.31	28.6	12.2	19.4	39.6	26.3	33.0	23.8	38.1	43.0	36.1	23.4	17.4	17.1
February	406,215	111,506	7.17	27.4	9.7	19.3	35.7	25.5	38.4	18.3	35.9	37.2	42.9	25.5	26.2	18.4
March	392,806	143,699	7.50	36.5	15.5	35.1	47.8	40.4	31.7	25.3	48.2	40.3	49.4	24.7	52.4	26.5
April	391,860	158,987	7.66	40.5	24.4	55.4	53.0	50.7	38.9	29.2	43.7	39.1	44.9	26.5	24.8	20.4
May	397,365	170,610	7.68	42.9	26.9	53.6	62.8	49.4	37.3	28.7	49.8	46.7	36.8	28.7	25.1	23.0
June	396,174	137,451	7.88	34.6	23.8	32.1	49.0	46.3	30.4	25.5	45.4	32.7	34.1	30.4	31.3	18.6
July	409,330	119,259	7.79	29.1	21.1	25.8	34.8	39.8	25.3	24.1	42.1	30.4	32.3	23.4	22.7	19.4
August	404,429	132,825	7.82	32.8	19.0	41.6	39.5	40.7	30.1	28.6	43.1	32.5	32.0	25.4	24.2	21.1
September	401.039	120,618	7.67	30.0	18.2	30.6	36.6	34.6	26.9	23.3	43.1	29.8	24.3	21.5	14.8	19.9
October	407,803	135,667	7.71	33.3	21.0	32.4	36.4	50.7	26.7	26.7	45.3	37.4	24.9	20.7	27.8	24.1

[1] Idle capacity reported as follows: October, 27,414 tons; November, 18,673 tons; December, 12,679 tons; January, 12,687 tons; February, 14,150 tons; March 7,313, tons; April, 3,564 tons; May, 6,397 tons; June, 7,152 tons; July, 14,937 tons; August, 8,699 tons; September, 8,140 tons; October, 8,790 tons.

Aggregates Statistics *

SHIPMENTS of sand and gravel, crushed stone, and slag on Class I railroads during three-quarters of 1934 were about one-third greater than during the corresponding period of 1933. Although comparisons with 1933 lose significance because of extraordinarily low levels reached during that year, this rise nevertheless apparently represents definite recovery. Total shipments of all aggregates accounted for, including a small quantity of sand and gravel transported by barge in the Pittsburgh district, totaled 35,953,302 short tons during nine months of 1934. This total is virtually identical to the comparable figure for 1932 and represents an increase of 29.8 per cent. from 1933.

Much of the sand and gravel, crushed stone, and slag transported by rail is used for concrete and, as might be expected, cement shipments during three-quarters of 1934 showed an increase of 19.5 per cent. over 1933. The indicated domestic demand for asphalt also increased—the figure for nine months of 1934 is 16.4 per cent. higher than 1933.

The Federal Reserve Board index of industrial production stood at 73 throughout the third quarter of 1934, considerably below the average of 90 for the corresponding quarter of 1933. For nine months, however, the average for 1934 was 81 compared with 77 for 1933.

Anticipated activity in concrete paving during 1934 failed to materialize. Total pavement contract awards during the third quarter of 1934 were 19.0 per cent. lower than 1933 while contracts for roads only were 35.1 per cent. less. Total contracts awarded during nine months of 1934 were 17.2 per cent. greater than in 1933, but contracts exclusively for roads were 15.4 per cent. less.

Total construction contracts awarded from January through September 1934 were 62.5 per cent. above 1933 and even greater than during the comparable period of 1932. Much of this increase, however, represents public works activities for residential contracts—in terms of floor space—for nine months of 1934 were 6.8 per cent. below 1933, whereas engineering construction was 41.0 per cent. higher.

The increase in shipments of aggregates during nine months of 1934 was general over the entire United States. In the Southwestern region the in-

Table I.—MOVEMENTS OF AGGREGATES AND INDICATORS OF THEIR MARKETS IN THE THIRD QUARTER OF 1934 COMPARED WITH 1933

	Third Quarter			Calendar Year to September 30		
	1933	1934[1]	Change from 1933, Percent	1933	1934[1]	Change from 1933, Percent
Railway shipments, Class I roads[2] (excludes nonrevenue railroad ballast):						
Sand and gravel[3] ..... short tons	7,103,686	8,231,922	+15.9%	15,969,025	20,495,699	+28.3%
Crushed stone[4] ..... short tons	3,872,221	5,452,665	+41.0	9,038,353	12,278,886	+35.9
Furnace slag ..... short tons	648,205	743,677	+14.7	1,519,214	1,976,896	+30.1
Water shipments, Pittsburgh district:[5]						
Sand and gravel ..... short tons	618,300	598,985	− 3.1	1,170,772	1,201,821	+ 2.7
Total aggregates accounted for ..... short tons	12,242,412	15,027,249	+22.7	27,697,364	35,953,302	+29.8
General business activity:						
Portland cement shipments[6] ..... barrels	21,208,000	23,535,000	+11.0	49,135,000	58,700,000	+19.5
Indicated domestic demand, petroleum asphalt[7] .. short tons	712,256	868,487	+22.0	1,578,818	1,837,207	+16.4
Industrial production[8] ..... index numbers	90	73	−18.9	77	81	+ 5.2
Highway construction, concrete pavement contract awards:[9]						
Total ..... square yards	12,842,000	10,407,000	−19.0	25,698,000	30,106,000	+17.2
Roads only ..... square yards	11,005,000	7,141,000	−35.1	22,451,000	19,006,000	−15.4
Building construction contract awards:						
Total value[10]	$308,677,000	$349,830,000	+13.3	$740,791,000	$1,204,136,000	+62.5
Residential floor space[10] ..... square feet	20,048,000	14,672,000	−26.8	53,591,000	49,943,000	− 6.8
Engineering construction value[11]	$231,108,000	$321,554,000	+39.1	$676,738,000	$952,528,000	+41.0

[1] Figures for 1934 may be subject to revision. [2] Interstate Commerce Commission. [3] Excludes glass and molding sand. [4] Excludes fluxing stone. [5] Chief Statistician Board of Engineers for Rivers and Harbors. [6] B. W. Bagley, U. S. Bureau of Mines. [7] A. H. Redfield, U. S. Bureau of Mines. [8] Federal Reserve Board; 1923-25 average = 100. [9] Portland Cement Assn. [10] F. W. Dodge Corporation. [11] *Engineering News-Record.*

* Compiled by H. H. Hughes and K. G. Warner, U. S. Bureau of Mines.

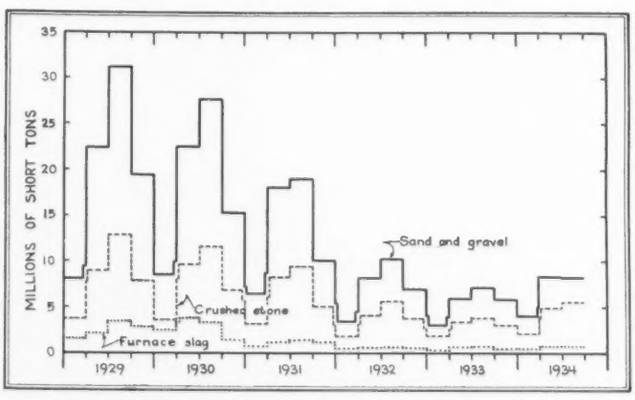


Fig. 1. Quarterly trends in rail movement of aggregates as indicated by revenue shipments. Non-revenue railroad ballast, fluxing stone, glass and molding sand not included in the figures.

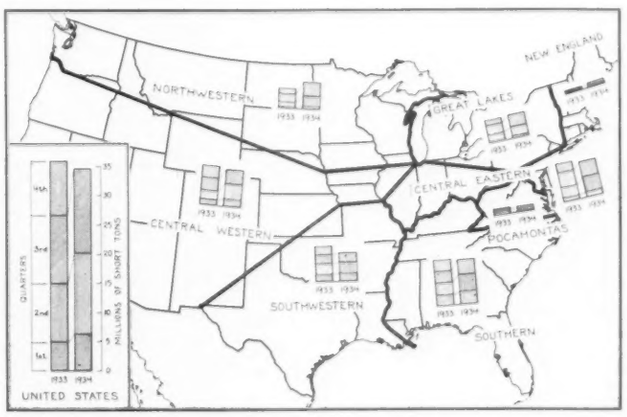


Fig. 2. Quarterly aggregates shipments of Class I railroads, 1933-1934, by regions.

Table II.—RAILWAY SHIPMENTS OF AGGREGATES IN THE THIRD QUARTER OF 1934 COMPARED WITH 1933, BY REGIONS

(Short tons)

Region	Third Quarter			Calendar Year to September 30		
	1933	1934[2]	Change from 1933, Percent	1933	1934[2]	Change from 1933, Percent
New England:						
Sand and gravel	68,570	60,890	− 11.2	108,743	155,001	+ 42.5
Crushed stone	165,936	358,529	+110.1	354,321	590,020	+ 66.5
Furnace slag	26			26	20	− 23.1
Total	234,532	419,419	+ 78.8	463,090	745,041	+ 60.9
Great Lakes:						
Sand and gravel	863,280	1,041,131	+ 20.6	1,576,824	2,174,165	+ 37.9
Crushed stone	656,308	958,840	+ 46.1	1,098,092	1,597,175	+ 45.5
Furnace slag	87,630	100,457	+ 14.6	235,944	211,916	− 10.2
Total	1,607,218	2,100,428	+ 30.7	2,910,860	3,983,256	+ 36.8
Central Eastern:						
Sand and gravel	1,170,818	1,215,586	+ 3.8	2,186,857	2,829,174	+ 29.4
Crushed stone	955,018	964,776	+ 1.0	1,913,494	1,980,923	+ 3.5
Furnace slag	443,195	433,578	− 2.2	894,938	1,272,288	+ 42.2
Total	2,569,031	2,613,940	+ 1.7	4,995,289	6,082,385	+ 21.8
Pocahontas:						
Sand and gravel	130,912	181,471	+ 38.6	423,086	479,097	+ 13.2
Crushed stone	110,496	129,635	+ 17.3	302,687	316,405	+ 4.5
Furnace slag	21,799	33,851	+ 55.3	41,390	91,996	+122.3
Total	263,207	344,957	+ 31.1	767,163	887,498	+ 15.7
Southern:						
Sand and gravel	935,987	1,225,185	+ 30.9	3,100,063	3,941,473	+ 27.1
Crushed stone	885,349	1,139,151	+ 28.7	2,386,584	3,203,780	+ 34.2
Furnace slag	89,934	161,178	+ 79.2	321,617	369,668	+ 14.9
Total	1,911,270	2,525,514	+ 32.1	5,808,264	7,514,921	+ 29.4
Northwestern:						
Sand and gravel	1,192,502	1,825,813	+ 53.1	2,011,239	3,253,549	+ 61.8
Crushed stone	163,492	520,580	+218.4	356,124	1,135,638	+218.9
Furnace slag	443	950	+114.4	1,078	2,680	+148.6
Total	1,356,437	2,347,343	+ 73.1	2,368,441	4,391,867	+ 85.4
Central Western:						
Sand and gravel	1,754,622	1,674,926	− 4.5	3,438,470	4,460,150	+ 29.7
Crushed stone	409,006	732,815	+ 79.2	1,188,668	1,753,980	+ 47.6
Furnace slag	28			493	2,417	+390.3
Total	2,163,656	2,407,741	+ 11.3	4,627,631	6,216,547	+ 34.3
Southwestern:						
Sand and gravel	986,995	1,006,920	+ 2.0	3,123,783	3,203,090	+ 2.5
Crushed stone	526,616	648,339	+ 23.1	1,437,363	1,700,965	+ 18.3
Furnace slag	5,150	13,663	+165.3	23,608	25,911	+ 9.8
Total	1,518,761	1,668,922	+ 9.9	4,584,754	4,929,966	+ 7.5

[1] Compiled from reports of the Interstate Commerce Commission.
[2] Figures for 1934 are subject to revision.

crease over 1933 was only 7.5 per cent. and only 15.7 per cent. in the Pocahontas region, but an advance of 60.9 per cent. in New England and 85.4 per cent. in the Northwestern region helped to bring the average for the country close to 30 per cent.

Lime (from page 58)

($9.03 in September) and $8.04 for chemical lime ($7.51 in September).

The ratio of total shipments to capacity was 33.3 per cent., while in September it was but 31.6 per cent. This gain is encouraging, coming in the face of generally lessened activity in both steel output and building construction. District 4 (Virginia, North Carolina and South Carolina) led the country with a shipments-to-capacity ratio of 50.7. District 7 (Illinois, Indiana and Missouri) ranked second with a ratio of 45.3.

Bucyrus-Erie Company of South Milwaukee, Wis., announce the appointment of C. G. Landes of 63 South High St., Columbus, O., as "Loadmaster" distributor for the central portion of Ohio. Collier Tractor & Equipment Co., 502 East 4th St., Reno, Nev., have been appointed "Loadmaster" distributor for the northern and Western sections of Nevada.

Hard-Surfacing (from page 57)

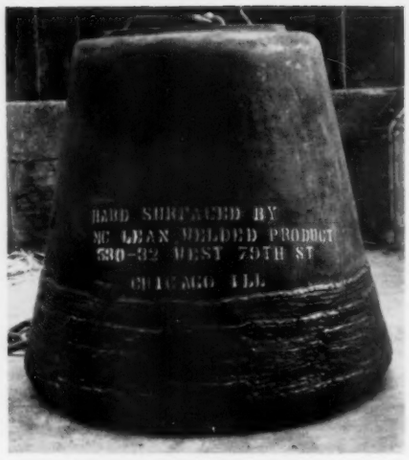
head. These statements are made on the authority of George A. McLean, president of the McLean Welded Products Corp., Chicago.

In the case of pump shells an old worn-out casing can be rebuilt with manganese, and then thoroughly work-hardened with an air hammer for approximately one-half the cost of a new shell and made to outlast it by 25 per cent. to 50 per cent., due to the work-hardened weld metal.

The most interesting of all manganese rebuilding is that of dipper teeth, according to Mr. McLean. Old worn-out teeth, after rebuilding with manganese, work-hardening and then applying approximately 2 in. of a suitable hard-surfacing material to each side of each tooth, will in most cases outlast new ones two to three times. In the majority of cases worn-out teeth can be rebuilt, work-hardened, and then hard-surfaced for less than the cost of new teeth.

There is no end to the big money savings that can be effected by rebuilding worn-out equipment. By using the proper material rebuilt parts will outlast new ones in most cases.

Ring gears made of a low-carbon steel can be rebuilt with a high-carbon alloy that will resist wear much more



Crusher mantle hard-surfaced and ready to give many more months of service.

successfully than the low-carbon casting, effecting large savings.

Hard-surfacing also is a very important factor in adding additional life to equipment that is subjected to severe abrasion, Mr. McLean finds. Hard-surfacing metals can be applied to practically any alloy. In the majority of cases a low-carbon-steel hard surface will outlast many expensive alloy castings when not subjected to impact.

In cases where articles are subjected to severe impact, such as pulverizer hammers, it is necessary to have a hard, tough under surface so that the metal below the hard-surfac-

Interior of centrifugal-pump shell showing application of hard-surfacing.

ing will not crumble and allow the surfacing to crack and break off. Hard-surfaced new digger teeth will not compare with rebuilt and hard-surfaced old teeth.

The manganese in new teeth is comparatively soft, Mr. McLean says, and after they are subjected to service the points work-harden themselves. Any hard-surfacing that might have been applied would to a great extent chip off. In rebuilt teeth, however, the manganese is work-hardened before the hard-surfacing is applied and will not allow that surfacing to crack or chip off.

The accompanying illustrations show some examples of various types of rebuilding and hard-surfacing jobs done in the McLean shops at 530 W. 79th St., Chicago.

Labor Conditions

EMPLOYMENT in the nonmetallic-mineral industries continued to decline slightly in November (a seasonal trend) with the exception of the cement industry which showed a pronounced gain, according to preliminary figures released by the U. S. Department of Labor. Complete data are shown in the accompanying tables.

Quarrying Industry—In November 1,126 quarries reported the employment of 32,959 workers, the corresponding figures for October being 1,118 establishments employing 34,149 workers. In September 1,140 quarries had reported 35,569 persons employed (Table I).

One-week pay-rolls (Table I) declined in November to $508,596, compared with a weekly pay-roll average of $542,831 in October.

Per-capita weekly earnings, however, gained slightly in October over the preceding month, the figure being $15.90 for October, a gain of 2.3 per cent. from September and a rise of 5.8 per cent. for the same month a year ago (Table I). In September the figure was $15.65, a drop of 2.3 per cent. from August, but 9.2 per cent. higher than the previous August.

The average number of hours worked per week (Table I) was 33.4 in October, and 33.0 in September. This was a gain of 3.1 per cent. over September, but a decline of 1.5 per cent. from the same month of last year.

Average hourly earnings, which were 47.8 c. in September, mounted to 48.2 c. in October—the highest for any month of the year with the exception of July, when they were 48.6 c. (Table I). This was a gain of .2 per cent. over the preceding month and 9 per cent. higher than average earnings of a year ago.

Comparisons of employment and pay-rolls in 1,116 quarries in September and October are shown in Table II. Increases in employment occurred in 16 states, the gain ranging from .6 per cent. in New Hampshire to 33.5 in Nebraska. Other notable gains in employment were in Connecticut, up 19.9 per cent., in Montana, up 23.9 per cent. and in South Dakota, where the increase was 27.1 per cent. over September. Decreases reached 37.6 per cent. in Mississippi and 36.5 per cent. in Washington, 29.3 per cent. in Utah and 27.9 per cent. in Wisconsin. No change was reported in Kentucky.

Pay-roll increases were noted in 18 states in October, while in the preceding month only 10 states had reported gains. The increases ranged from .7 per cent. in Louisiana to 56.5 per cent. in South Dakota. In Nebraska the gain was 39.1 per cent., in Illinois 23.3 per cent., in Montana 20.2 per cent., and in West Virginia 24.4 per cent. Pay-roll losses, in general, were small, except in Washington, where a decline of 45.9 per cent. was reported and in North Carolina, where the loss was 37.6 per cent.

In the month ended October 15, 2 concerns raised the wages of a total of 154 workers (Table III). There have been no decreases throughout the year and increases become fewer and fewer each month, indicating that stabilization of wage-rates is being accomplished.

Cement Industry—A total of 140

Table I.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
1933																		
November	1,185	34,303	51.1	3.9	**3.4**	$497,238	28.3	9.3	**4.4**	$14.50	5.5	**.9**	32.5	6.6	.....	45.2c.	**1.1**	.....
December	1,162	30,658	45.3	11.3	**7.1**	434,751	24.4	13.7	**10.4**	14.18	2.7	**3.3**	31.3	3.7	.....	46.1c.	**.9**	.....
1934																		
January	1,144	26,217	39.7	12.5	**13.1**	368,224	21.3	12.6	**17.7**	14.05	.1	**4.1**	30.8	1.9	.....	45.6c.	**.2**	.....
February	1,192	26,561	38.8	2.2	**11.5**	374,577	21.0	1.5	**20.7**	14.10	**.7**	**8.2**	31.1	**1.3**	.....	45.4c.	[2]	.....
March	1,180	28,610	42.0	**8.3**	**19.7**	434,572	24.1	**14.8**	**35.4**	15.19	**5.9**	**13.2**	33.5	**6.3**	2.7	45.6c.	**.7**	**17.7**
April	1,186	32,629	48.7	**15.9**	**23.9**	522,154	29.9	**23.9**	**48.0**	16.00	**6.9**	**19.5**	34.2	**4.0**	4.3	46.9c.	**2.6**	**27.1**
May	1,148	36,111	54.3	**11.4**	**25.1**	615,248	35.0	**17.3**	**47.1**	17.04	**5.3**	**17.7**	36.0	**4.0**	8.0	47.5c.	**.8**	**30.1**
June	1,149	38,250	56.6	**4.4**	**19.7**	648,890	37.0	**5.5**	**34.5**	16.96	**1.1**	**12.6**	35.8	**1.4**	11.9	48.0c.	**.8**	**30.1**
July	1,087	34,830	55.6	1.9	**12.3**	568,501	35.0	5.4	**23.2**	16.32	3.6	**9.6**	34.0	5.0	17.0	48.6c.	**1.3**	**32.4**
August	1,122	36,151	54.7	1.5	**6.0**	580,114	34.0	2.8	**13.7**	16.05	1.4	**7.4**	33.7	.6	11.3	47.9c.	**1.4**	**15.7**
September	1,140	35,569	53.3	2.6	**1.3**	556,778	32.4	4.8	**10.6**	15.65	2.3	**9.2**	33.0	2.9	3.0	47.8c.	.2	**10.2**
October	1,118	34,149	51.8	2.9	**2.6**	542,831	32.1	.8	**2.9**	15.90	**2.3**	**5.8**	33.4	**3.1**	1.5	48.2c.	**.2**	**9.0**
November	1,126	32,959	.....	.....	.....	508,596	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers were based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.
[2] No change.

Table III.—CHANGES IN WAGE RATES IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
Sep. 15	1,152	35,442	1,059	32,390	93	3,052	.....	.....
Oct. 15	1,202	36,894	1,179	35,305	21	1,516	2	73
Nov. 15	1,185	34,303	1,178	34,132	7	171	.....	.....
Dec. 15	1,162	30,658	1,149	30,431	12	214	1	13
Jan. 15	1,144	26,251	1,138	26,149	6	68	.....	.....
Feb. 15	1,192	26,561	1,189	26,536	3	25	.....	.....
Mar. 15	1,180	28,610	1,179	28,550	1	60	.....	.....
Apr. 15	1,186	32,629	1,166	31,007	20	1,622	.....	.....
May 15	1,148	36,111	1,123	33,616	25	2,495	.....	.....
June 15	1,149	38,250	1,139	37,838	10	412	.....	.....
July 15	1,087	34,830	1,078	34,786	9	44	.....	.....
Aug. 15	1,122	36,151	1,121	36,071	1	80	.....	.....
Sep. 15	1,140	35,569	1,138	35,537	2	32	.....	.....
Oct. 15	1,118	34,149	1,116	33,995	2	154	.....	.....

Table V.—CHANGES IN WAGE RATES IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Number of Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
Sep. 15	129	15,545	126	15,451	3	94	.....	.....
Oct. 15	131	13,199	128	12,609	3	510	.....	.....
Nov. 15	113	10,071	113	10,071	.....	.....	.....	.....
Dec. 15	129	10,851	129	10,851	.....	.....	.....	.....
Jan. 15	121	9,495	121	9,495	.....	.....	.....	.....
Feb. 15	125	12,745	125	12,745	.....	.....	.....	.....
Mar. 15	120	13,023	120	13,023	.....	.....	.....	.....
Apr. 15	119	12,414	96	7,694	23	4,720	.....	.....
May 15	122	17,593	115	16,372	7	1,221	.....	.....
June 15	131	19,495	119	17,259	12	2,200	.....	.....
July 15	129	19,158	127	19,026	2	132	.....	.....
Aug. 15	123	16,920	122	16,814	1	106	.....	.....
Sep. 15	122	16,799	121	16,763	1	36	.....	.....
Oct. 15	116	15,849	116	15,849	.....	.....	.....	.....

cement plants reported for November —the highest in more than a year. This increase in cement-mill operation naturally boosted the total number of workers employed. The figure stands at 17,989 for November; in October it was 15,849; in September 16,799; and in August 16,920 (Table IV).

One-week pay-rolls for November were $329,468, compared with $300,974 in October, and $177,760 in November of 1933.

Per-capita weekly earnings, however, continue to decrease, the figure for November being $18.98, a loss of .3 per cent. from October, but a gain of 3.3 per cent. over the same month a year ago. Average hours worked per week were 33.0 in November, compared to 32.9 in October. Average hourly earnings for November were 57.6 c.—within .2 c. of the highest figure for the year which occurred in August.

Table II.—COMPARISON OF EMPLOYMENT AND PAY-ROLLS IN IDENTICAL QUARRY AND NONMETALLIC-MINING ESTABLISHMENTS, IN SEPTEMBER AND OCTOBER, 1934, BY STATES

(Gains are shown in bold-faced type, losses in light-faced type)

State	Number of Establishments	Number on Pay-Roll, October, 1934	Percentage Change from September, 1934	Amount of Pay-Roll (1 week) October, 1934	Percentage Change from Septemoer, 1934
Alabama	16	651	10.5	$7,295	17.9
Arizona					
Arkansas	4	127	**2.4**	1,192	4.8
California	43	1,132	**2.5**	22,281	**14.3**
Colorado	5	20	13.0	279	10.0
Connecticut	25	403	**19.9**	5,939	**5.5**
Delaware					
Dist. of Columbia					
Florida	16	878	.2	10,371	4.7
Georgia	26	1,545	**6.3**	14,797	**3.9**
Idaho					
Illinois	17	405	**6.0**	7,398	**23.3**
Indiana	75	1,547	1.9	26,618	**9.0**
Iowa	25	381	4.3	7,566	**14.0**
Kansas	33	1,318	**2.0**	26,498	.8
Kentucky	35	1,372		14,992	.6
Louisiana	6	625	1.8	8,396	**.7**
Maine	10	527	2.8	11,728	**3.6**
Maryland	8	225	6.3	3,303	7.6
Massachusetts	18	461	3.6	9,625	8.2
Michigan	49	1,694	6.2	29,406	5.5
Minnesota	23	303	15.1	5,064	8.5
Mississippi	10	133	37.6	1,840	35.7
Missouri	48	1,297	**4.8**	17,920	**8.0**
Montana	8	88	**23.9**	1,467	**20.2**
Nebraska	9	219	**33.5**	2,738	**39.1**
Nevada					
New Hampshire	10	326	**.6**	8,335	**1.0**
New Jersey	34	653	**3.5**	13,297	**11.4**
New Mexico					
New York	76	2,480	3.1	49,846	6.4
North Carolina	10	232	24.4	2,690	37.6
North Dakota					
Ohio	138	3,656	6.5	56,621	3.1
Oklahoma	16	161	**1.3**	1,568	6.2
Oregon					
Pennsylvania	145	5,158	5.8	82,523	**2.5**
Rhode Island					
South Carolina	5	187	1.1	2,079	**3.6**
South Dakota	6	75	**27.1**	1,283	**56.5**
Tennessee	24	816	**1.2**	9,387	**5.3**
Texas	22	980	11.7	20,553	22.5
Utah	8	118	29.3	2,021	10.1
Vermont	38	1,948	.1	35,400	11.6
Virginia	30	1,084	9.2	13,061	3.8
Washington	16	320	36.5	4,597	45.9
West Virginia	17	768	**4.5**	9,922	**24.4**
Wisconsin	12	230	27.9	3,834	19.6
Wyoming					
Totals	1,116	34,543		$553,730	

Table Shows Capacities for Vibrating Screens

Something that every plant operator has long hoped for, but has been unable to obtain, is a table for figuring the capacities of vibrating screens. The subject is difficult and complicated and little data—even approximate—has been available.

In a new bulletin, No. 266-J, just published by Smith Engineering Works, Milwaukee, Wis., such a table appears. It enables any user to figure capacities for any size screen, of any number of decks, handling any percentage of oversize or undersize, and operating on wet or dry materials.

The table is applicable to any make of vibrating screen operating on the eccentric principle, according to the company.

Geologic Dept. Publishes Books on Pa. Nonmetallics

A press bulletin issued by the Pennsylvania Topographic and Geologic Survey lists seven books and seven pamphlets which have been published in the last 18 months. Of interest to non-metallic mineral producers are the following:

Clay and Shale Resources in Southwestern Pennsylvania, by Henry Leighton and J. B. Shaw. 190 p. Bulletin M 17.

Slate in Pennsylvania, by C. H. Behre, Jr. 390 p. Bulletin M 16.

The Undeveloped Mineral Resources of Pennsylvania, by George H. Ashley. 16 p. Bulletin M 18A.

Limestones of Pennsylvania, by B. L. Miller. 720 p. Bulletin M 20.

Correction

It was erroneously stated in the January, 1935 issue of PIT AND QUARRY, page 45, that the installation of Lee Process clinker coolers in the plant of the San Antonio Portland Cement Co., San Antonio, Tex., reduced the gas consumption from 1,000 to 1,250 cu. ft. per bbl. This was a typographical error and should have read "from 1,600 to 1,250 cu. ft. per bbl."

Table IV.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
1933																		
November	113	10,071	37.8	.4	7.8	$177,760	21.2	7.1	8.6	$17.65	6.7	.8	32.0	7.2	.....	52.8c.	2.7	.....
December	129	10,831	33.6	11.3	**2.1**	172,067	17.6	17.1	**2.3**	15.86	6.6	**.2**	28.5	10.9	.....	54.2c.	**2.6**	.....
1934																		
January	121	9,495	32.6	2.8	**8.7**	164,507	17.9	**1.7**	**19.3**	17.33	**4.6**	**9.3**	31.4	**7.9**	.....	55.7c.	1.1	.....
February	125	12,745	37.6	**15.2**	**26.6**	212,111	20.8	**16.2**	**39.6**	16.64	**.8**	**10.2**	30.8	**4.1**	.....	53.1c.	1.7	.....
March	120	13,023	42.4	**3.4**	**30.1**	224,218	24.1	**7.0**	**46.1**	17.22	**3.5**	**11.7**	31.9	**4.6**	10.6	53.6c.	**.2**	**29.9**
April	119	12,414	48.0	**13.3**	**24.0**	245,774	30.6	**27.0**	**65.4**	19.80	**12.1**	**33.3**	35.3	**7.6**	**3.6**	55.5c.	**3.7**	**33.3**
May	122	17,593	57.6	**20.0**	**42.2**	332,867	35.8	**17.1**	**68.1**	18.92	2.4	**18.3**	33.2	3.5	13.0	56.8c.	**2.2**	**39.0**
June	131	19,459	59.1	**2.6**	**27.1**	395,590	39.9	**11.4**	**57.7**	20.33	**8.5**	**23.9**	35.6	**8.9**	8.0	56.4c.	.9	**39.1**
July	129	19,158	58.4	1.2	**16.3**	387,041	39.1	1.9	**40.6**	20.20	.8	**20.7**	34.7	2.3	8.7	57.1c.	**.7**	**35.4**
August	123	16,920	55.0	5.8	**3.6**	323,831	35.4	9.6	**10.6**	19.14	.4	**6.6**	33.0	5.2	5.9	57.8c.	**1.0**	**20.3**
September	122	16,799	54.0	1.8	**12.5**	320,082	33.9	4.2	**31.4**	19.05	2.5	**16.2**	32.9	1.2	**6.3**	57.2c.	**.8**	**13.1**
October	116	15,849	51.0	5.5	**15.9**	300,874	33.1	2.3	**34.0**	18.98	.3	**3.3**	33.0	**1.9**	**3.5**	57.6c.	**.7**	**6.9**
November	140	17,989	.....	.....	.....	329,468	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers are based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.

New Machinery and Supplies

Motor-Driven Grab Bucket Has Numerous Advantages

Improved motor-driven grab buckets ranging from ½ to 3 cu.yd. capacity for handling ore, limestone, dolomite, slag, sand, and similar bulk materials are announced by Erie Steel Construction Co. Erie, Pa. With d-c. special Westinghouse control, it makes possible the use of only two conductors between the control cab and bucket.

Since each bucket carries its own motor, the buckets can be attached to cranes, monorail hoists, or any hoisting equipment at which electric power is available. After the hoist-black hook slips into the holding yoke of the bucket and an electrical connection is made by a simple plug device, the bucket is ready to go to work.

Grab bucket with self-contained motor.

Power is supplied either through a loop cable or a cable paid out from a lightweight drum—frequently spring operated. Since the unit is self-contained, there is no tendency to lift out of the material while closing; and it digs itself in without being dropped.

A Westinghouse crane motor, brake, and gearing are mounted in the bucket head. Either an alternation or direct-current motor can be used. The coupling between motor and worm gear serves as a braking wheel. Powerful forces are exerted by means of the cables through sheaves, operated by the motor through the gear—which makes for fast and efficient digging. All moving parts are lubricated by the forced Alemite system.

Annealed acid-electric steel castings are used. The bucket has been designed for proper balance, equalization of strain to prevent warpage, and the heavy, plate scoops are reinforced with hardened cutting edges. The scoops are so hinged that the height varies little whether they are open or closed. A bucket of 1 cu.yd., for instance, is 6 ft. 6 in. high when closed, and 7 ft. 9 in. when open. The power-arm type of construction results in a minimum number of moving parts on the hinge pin, reduces wear, and preserves positive scoop alignment. Special teeth can be attached to the cutting lip for hard material. It is thus a digging device as well as a scoop.

Stator Laminations Are Welded to Motor Frame

An entirely new line of convertible squirrel-cage and slip-ring induction motors, offering all standard frequencies for service ranging from 110 to 220 v., has just been announced by the Harnischfeger Corp., Milwaukee, Wis.

Built in accordance with the standards adopted by the National Electrical Manufacturers Assn., the outstanding feature of these new P&H motors is their ready convertibility from open type to fan cooled, splash proof or totally enclosed construction. This is accomplished through the design of the frame, and heads and bearings to permit interchangeability in the four above mentioned types of single or multi-speed squirrel-cage and slip-ring motors.

This development in standard A.C. motors is especially significant to machinery manufacturers because of the adaptability of these units to various service requirements.

Among the other interesting features is the unique mounting of the stator laminations which are stacked between heavy steel end rings and the entire assembly then welded to the frame. This construction provides absolute rigidity and makes it impossible for the stator core to shake loose.

The rotor windings are assembled from round or rectangular hard drawn copper bars which are placed in the rotor slots without insulation or slot wedges. The ends of the bars are brazed to the end rings by an electric arc torch.

New All-Welded Bucket Is Strong but Light in Weight

A new lightweight bucket, designed to reduce dead weight to a minimum and at the same time provide great strength through all-welded construction, has just been announced by the Harnischfeger Corp. of Milwaukee.

In this new dragline bucket has been achieved the desired combination of exceptional strength, perfect balance and tapered design with a smoother inside surface.

The bottom, sides and back are formed by a single heavy steel plate securely seamed at the back and with a heavy angle reinforcement mounted around the entire upper edge for additional rigidity. Four forged wearing shoes or runners are welded to the bottom to take the wear from the bucket shell.

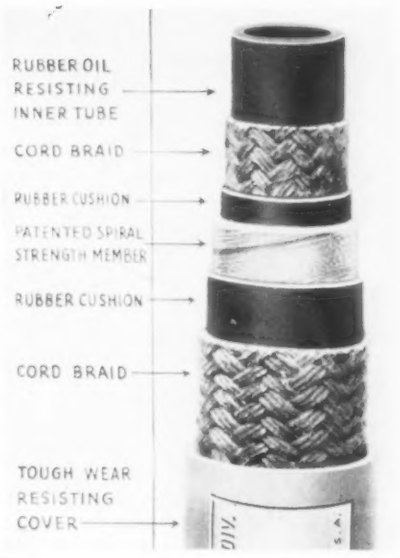
The arc and side reinforcements are fabricated as a single unit with the lip plate, the latter being 2 inches thick and capable of taking the punishment of a much heavier bucket. This new bucket is an ideal general purpose unit for high production work.

Unequal Stresses Avoided in Compensated Air Hose

A new air hose, possessing to an increased extent the advantages of both wrapped duck and braided hose with none of their weaknesses, has just been announced by The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.

In the new construction, for which patents have been applied, the unequal ply stresses set up in the wall of the hose by longitudinal and lateral tensions incident with operation, are compensated and made equal. This is accomplished solely within the unique construction, which consists of two strength members, a braided cord member for longitudinal stresses and a spiralled strength member for expansion and lateral stresses, both welded in tough age-resisting rubber.

By this balanced construction, internal friction and chafing are eliminated; it effectively resists surge and pulsation. Compensated air hose is so strong that present-



Progressive-sectional view of the patented air hose.

day working pressures may be completely disregarded.

One of the many facts discovered during the conducting of extensive tests was the definitely longer life and superiority of the compensated construction. Further details may be had from the manufacturer.

High-Speed Gears Used in New Motorized Reducer

In order to meet the growing demand for still greater compactness and economy in self-contained enclosed speed reducing units, Link-Belt Co. announces that it is placing on the market a new line of motorized helical-gear reducers, an outstanding feature of which is the unusual accessibility of the motor and the high speed gears.

A standard round-frame motor conforming with National Electrical Manufacturers' Ass'n specifications, is secured firmly to side of reducer housing by means of an adapter casting which supports the motor shaft in over-size anti-friction bearings close to the pinion, thus assuring good alignment and proper mesh of pinion with its mate. The complete motor, with adapter and motor pinion, may be removed as a unit for inspection or maintenance, without disturbing the alignment of the motor, or of the gears remaining in the reducer housing; in fact, the motor pinion and gear are removable without disconnecting the driven machine or disturbing the low speed gears.

All gears are of the helical type, with

Link-Belt motorized reducer.

teeth cut from heat-treated alloy steel. Anti-friction bearings are used throughout. The low speed shaft and its bearings are designed to carry overhung loads.

The new motorized reducers may be mounted on floor, ceiling or wall; and are available in double reduction for ½ to 75 h.p., in ratios up to 38½ to 1, and in triple reduction up to 30 h.p., in ratios up to 292 to 1. They embody the usual advantages of not requiring a motor base plate or a high-speed shaft coupling, and as the motor forms an integral part of the reducer, the proper alignment of motor shaft is definitely assured at all times.

Extra Ventilation Makes New Goggles Comfortable

Men who work in confined spaces or where the temperature or humidity is high, will welcome the Duralite-50 "hot-workers' goggle" just announced by American Optical Co.

This new goggle is said to practically double the area usually allowed for ventilation. The extra ventilation in back of the lenses keeps them free from fogging and steaming—and also keeps the area around the eyes cool and so prevents perspiration from obscuring the vision.

The hazards of stumbling, falling or colliding with objects because of obscured vision due to fogged lenses, are eliminated by these new goggles. Besides providing

A pair of full-view goggles.

clear and comfortable vision, they provide dependable eye protection. Their sturdy construction plus the super armorplate lenses with which they are fitted give the worker a goggle he can wear with comfort and with confidence.

Complete information concerning these goggles may be obtained from American Optical Co., Southbridge, Mass., or from American Optical Co. branch offices located in the principal industrial centers.

New Blasting Material Is Remarkably Safe to Use

A revolutionary new blasting material known as "Nitramon" for use in quarries and in other blasting operations such as stripping, was announced at the technical section convention of the explosives department of the du Pont Co., which opened Jan. 22, at Wilmington, Del. This new product, it was stated, can not be detonated by the strongest commercial blasting cap, by impact, by flame, nor by shooting a rifle bullet into it. In actual use it is exploded by means of a large diameter cartridge of dynamite. It is non-headache producing and is rendered absolutely water resistant by being sealed up tightly in a tin can. It is stated to represent the ultimate in safety in so far as a blasting agent is concerned. It represents a very radical departure in the explosives field. This new development has been covered by two patents, one for the product itself and the other covering its method of use. It is non-freezing.

The new product will be marketed only in large diameters, for example, 4 in., 4½ in., 5 in. and 7 in. It is adapted solely for use in large diameters and has been designed specifically to fulfil as nearly as possible the ideal qualifications for use in quarries and in coal stripping operations.

The fact that it can not be detonated by

Du Pont booth at the Chicago convention, featuring the new explosive.

any of the ordinary means used to detonate explosives makes it safe for transportation in a degree hitherto unknown for any blasting agent.

Work on this new explosive has been going on for months. It has been tested both in the laboratory and in the field and by agencies outside the company.

Synthetic Rubber Product Practical for Wide Use

The remarkable properties of a new material called "Koroseal" is astonishing the chemists and engineers of The B. F. Goodrich Co. responsible for its discovery and development.

At present the prohibitive cost of manufacturing Koroseal precludes its adoption as a general substitute for rubber but some of its characteristics render it far superior to rubber for certain specialized applications.

The resistance of Koroseal to swelling when exposed to many oils and greases and to disintegration in the presence of corrosive chemicals is unusual. It even resists the action of chromic acid and hot, concentrated nitric acid. The new material also has been shown to be ideal for a piston packing because of the tight seal around the piston afforded by the Koroseal compound in the presence of oil.

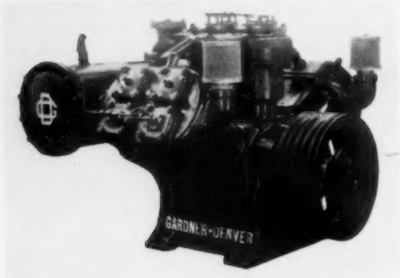
Great resistance to moisture and stability over a wide range of temperature make the extremely soft varieties of Koroseal ideal for molding ornamental plaster casts. Over five hundred casts have been made in regular factory operations in individual Koroseal molds still in service. Glue-glycerine molds formerly were discarded after less than one-tenth as many castings.

According to J. W. Schade, Director of Research at Goodrich, Koroseal compositions possess far greater flexing life and corrosion resistance than rubber. Unlike rubber Koroseal does not swell and soften in oils but retains its form and toughness. For oil sealing gaskets where swelling is objectionable, Koroseal promises great advantages over rubber. Moreover, it offers great resistance to light and to oxidation.

Design of This Compressor Departs from Conventional

Carrying still further the modern trend towards more delivered air, lower power consumption and longer compressor life, Gardner-Denver engineers have developed a new 6-cyl. 2 stage water-cooled compressor embodying distinctive features. These features are said to provide more delivered air, with a resultant saving in power cost.

An outstanding departure from conventional compressor design is the use of four small-diameter low pressure cylinders, instead of two large ones, this construction permitting the use of small, lightweight pistons and considerably reducing the inertia loads. The use of two pairs of low pressure water cooled cylinders provides lower air temperatures than previously obtained in small vertical compressors, with corresponding saving in horsepower. By watercooling the cylinder walls, lower wall temperatures are obtained, with better lubrication and longer life. Distortion of cylinder walls from heat is eliminated, and, in addition, the compressor operates independently of atmospheric temperatures.



Two-stage water-cooled compressor.

Combining all the desirable characteristics of powerful rotation, satisfactory blowing and easy riding found in other Gardner-Denver rock drills, a new 28-lb. sinker drill, known as the S-35, has also just been announced by the Gardner-Denver Co.

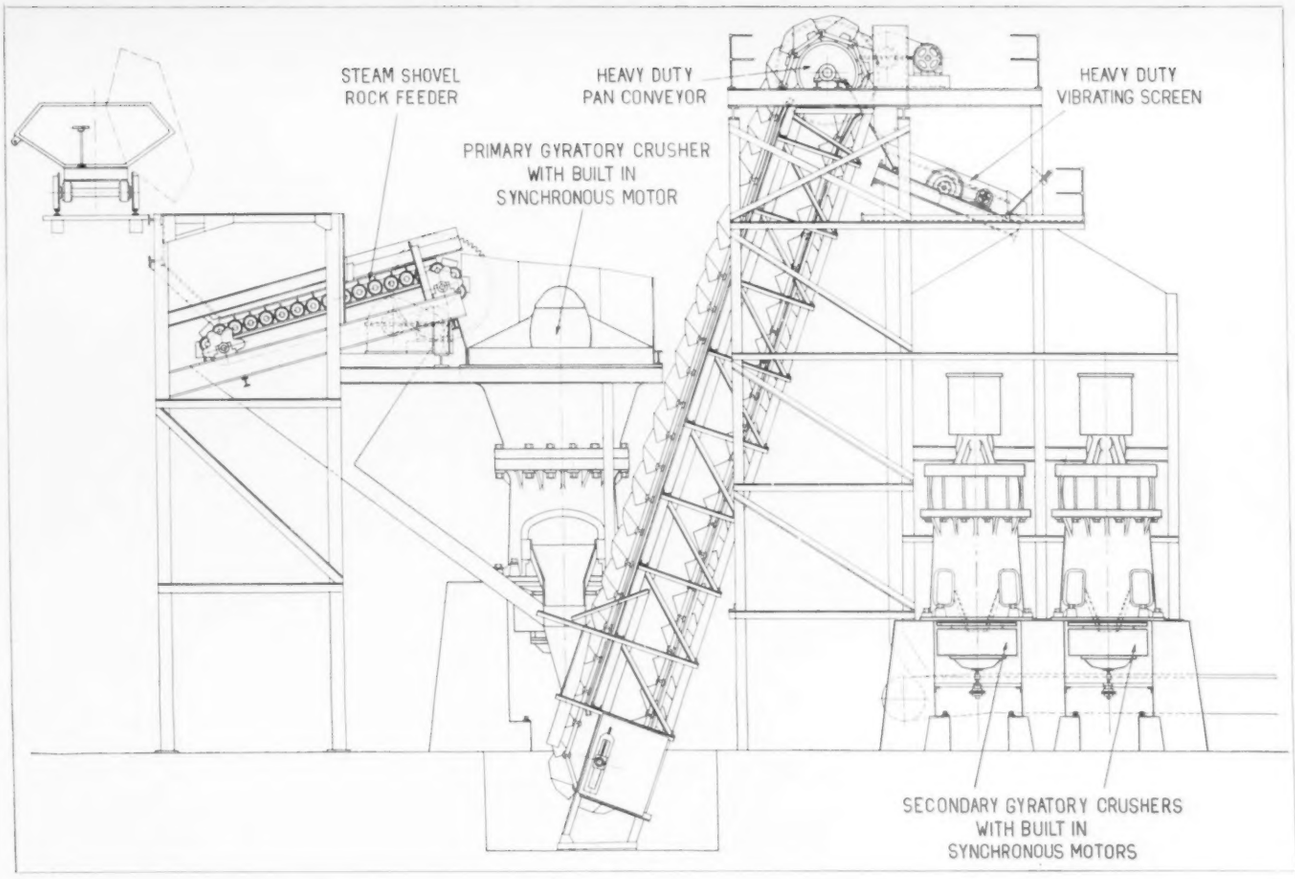
Owing to its light weight, the new drill is exceptionally easy to handle in places inaccessible to a heavier drill, and is especially suited for drilling in soft and medium formations, as well as for plugging in quarries or on construction jobs.

Develops Rocker Dump Car for Mine, Tunnel Service

The Koppel Industrial Car & Equipment Co., Koppel, Pa., has developed an improved-type, low-height rocker dump car with positive automatic locks, for use in tunnel service. The sides of the body are made of one continuous heavy plate, flanged to channel shape at the top. A pressed steel Z-shaped section, extending the entire length of the body, is welded to the outer flange of the mould plate. It is claimed that this box girder construction, peculiar to rocker side-dump cars, serves as a heavy side stiffener to minimize the damage oftentimes resulting from accidental power-shovel blows.

Positive cast steel automatic locking levers eliminate the possibility of accidental dumping at any time, particularly when operating in trains at high speed. The body can only be dumped after two safety hooks, one at each end opposite the discharge side have been manually released. The Koppel company claims that just one man is required to dump the car and that the body, on account of being so well balanced, can be returned with very little effort to normal or load carrying position, where it is automatically locked and held in place. The running gear of this 4-cu. yd., 36-in. gauge car is of the double spring suspended inside type, equipped with roller bearings. Each car is provided with automatic couplers, although ordinary link and pin couplers can be used.

A large Eastern dredging company increases the life of its dredge buckets by hard-facing with Haynes Stellite. The accompanying illustration shows one of 54 buckets being protected against the wearing action of highly-abrasive sand, gravel, mud and clay by an electrically-welded layer of this cobalt-chromium, tungsten hard-facing alloy. It is said that three pounds of this material applied to the wearing sections of the lip of each bucket increases its life many times.



The above cut illustrates equipment for the reduction of materials in an outstanding installation made in 1934 by the National Portland Cement Company at Brodhead, Pennsylvania.

It consists of the following:

1—Heavy duty Steam Shovel Rock Feeder.

1—No. 36 Primary Ball Bearing Gearless Gyratory Crusher with a 150 H.P. *synchronous motor built in the pulley.

1—Heavy duty Steel Pan Elevator direct connected through a gear reduction to its motor.

2—No. 49 Ball Bearing Gearless Crushers for Fine Crushing. The head and shaft on each of these machines are suspended on springs for permitting bits of steel to pass through between the head and concaves. Each crusher is equipped with a 75 H.P. *synchronous motor built in its pulley.

*All synchronous motors have 250% starting torque and 300% pull out torque enabling the crushers to be started when they are full of stone.

All of this equipment, including the synchronous motors, was built and furnished by the Kennedy Van Saun Mfg. & Eng. Corporation of Danville, Pa.

The crushing in this important plant is done for approximately 300 H.P., whereas in "alleged" modern plants 800 H.P. has been used to do the same work with other types of equipment. This should be of interest to all dealing with the reduction of materials.

No such plant has ever been installed embodying ruggedness, simplicity, saving in cost of maintenance, and so great a ratio of reduction.

Write us for further information

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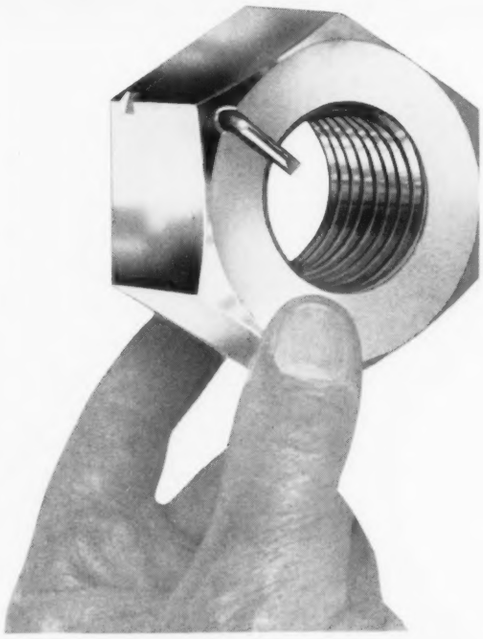

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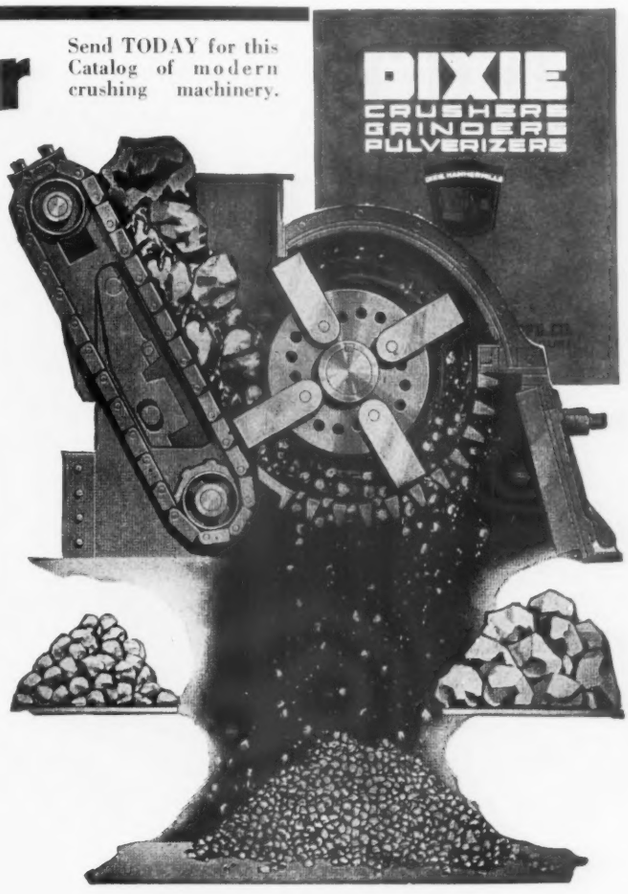

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*Eagle Iron Works

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*Hardinge Co.

Air Separators
*Hardinge Co.
Raymond Bros. Impact Pulv. Co.

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*Wickwire Spencer Steel Co.

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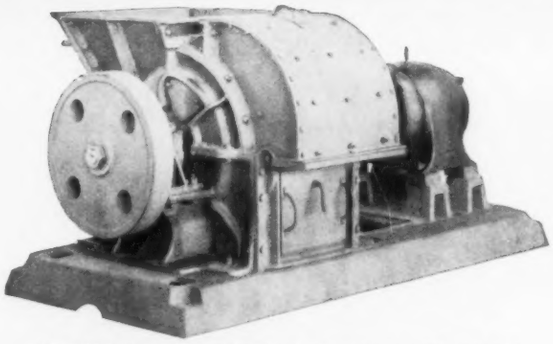

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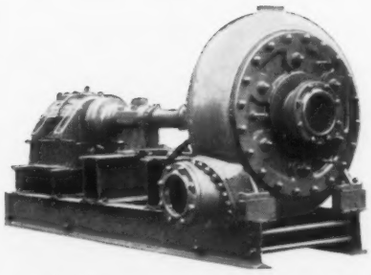

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SUPER DRY PANS—For especially large tonnages.

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DRYERS—Revolving cylindrical, of various sizes.

JIGS—For concentrating and beneficiating hematite and manganese ores.

SCREENS—Cylindrical and conical screens of any size and capacity.

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McLanahan & Stone Corp.
Hollidaysburg, Pa.

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has been hitting the "high water mark" for forty-five years. It is your assurance of economy in all of your pumping operations.

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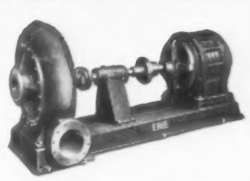

ERIE PUMP & ENGINE WORKS
153 Glenwood Ave., Medina, N. Y.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

Diesel Engines (See Engines—Diesel)

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
Koehring Co.

Doors (Iron)
Smith Wire & Iron Works, F. P.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Good Roads Machy. Corp.
*Link-Belt Co.

Dragline Excavators
*Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
*Harnischfeger Corp.
Koehring Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.

Dredges
Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Drilling Contractors
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills (Core)
*Ingersoll-Rand Co.
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills, Diamond
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills (Rock)
*Jeffrey Mfg. Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Tyler Co., W. S.

Dust-Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Raymond Bros. Impact Pulv. Co.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dust Hoods and Helmets
Pulmosan Safety Equipment Corp.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bonnot Co.
Cross Engr. Co.
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
Cummins Engine Co.
*Nordberg Mfg. Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bonnot Co.
Good Roads Machy. Corp.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Fencing (Woven Wire)
*American Steel & Wire Co.
Buffalo Wire Works Co.
Smith Wire & Iron Works, F. P.

Fire Escapes
Smith Wire & Iron Works, F. P.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Gaskets
Goodyear Tire & Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gas Producers
Wellman Engr. Co.

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Gears and Pinions
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Gelatin (See Explosives)

Generators (See Motors and Generators)

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Goggles
Pulmosan Safety Equipment Corp.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grating (Steel)
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzlies
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.

*Eagle Iron Works
Good Roads Machy. Corp.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.

Guns (Hydraulic)
Hetherington & Berner, Inc.
*Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Hoists
*Harnischfeger Corp.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.

Hose (Air, Steam and Water)
Goodyear Tire & Rubber Co.
Self-Vulcanizing Rubber Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

Idlers
American Manganese Steel Co.
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Kilns (Vertical)
*Hardinge Co.

Lime-Handling Equipment
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Hardinge Co.

Lime Kilns
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Liquid Rubber
Self-Vulcanizing Rubber Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Electric, Gas and Steam)
*Lima Locomotive Works

Locomotives (Trolley-Battery)
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.

Mill Liners and Linings
American Manganese Steel Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
Sprout, Waldron & Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
Buffalo Wire Works Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Nuts
Automatic Nut Co.

Packings
Goodyear Tire and Rubber Co.
Self-Vulcanizing Rubber Co.

Partitions (Wire)
Buffalo Wire Works Co.
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.

Paving Mixers
Jaeger Machine Co.
Koehring Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Plastic Rubber
Self-Vulcanizing Rubber Co.

Pipe, Dredge (Floating and Shore)
*Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
*Taylor Forge & Pipe Works

Plug Valves (See Valves)

Pneumatic Drills (See Drills, Rock)

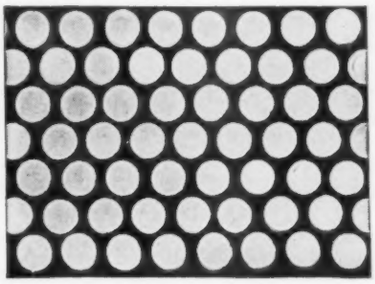
Portable Conveyors
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Universal Crusher Co.

Portable Engines (See Engines—Internal Combustion)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

The Morrow Manufacturing Co.
Wellston, Ohio

They Get the JOBS

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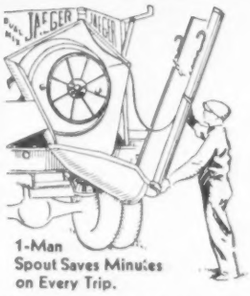
Because they offer every facility for the faster delivery of better concrete ("Dual-Mix" action, 1-man chute, dual controls, rapid accurate water tank and patented discharge) Jaeger Truck Mixers get most of the jobs, serve them at lowest cost, and continue to outsell all other makes. Sizes 1 to 5 cubic yards.

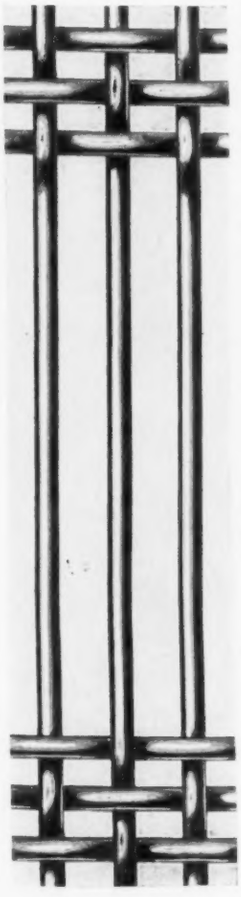
Write for details, prices.



1-Man Spout Saves Minutes on Every Trip.

THE JAEGER MACHINE CO. 602 Dublin Ave., Columbus, Ohio

TY-ROD



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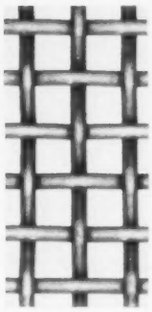
for more profitable production of stone, gravel, sand, cement and aggregates.

TON-CAP

TY-LOY



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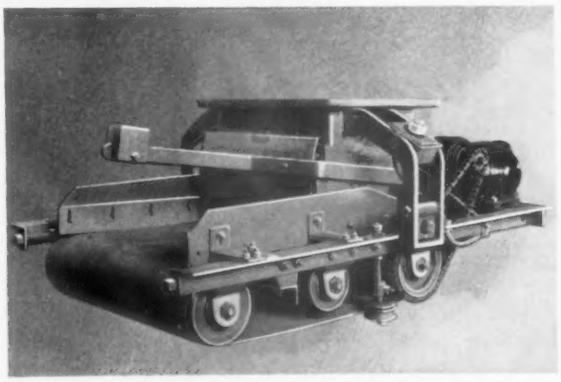
The W. S. TYLER Company

CLEVELAND, OHIO, U. S. A.

Manufacturers of

Screens, Screening Machinery, Dryers, Scrubbers, Testing Equipment

HARDINGE



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This simple, accurate, low cost Feeder will correct many present ills of grinding, drying and mixing operations. Tell us the type of Feeder you are now using—We will tell you what improvement you can expect with the Hardinge Constant Weight Feeder. Write for Bulletin 33B.

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INCORPORATED
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New York—122 E. 42nd St. San Francisco—444 Market St.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.

Pulverizers (See also Crushers; Mills; etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulv. Co.
*Universal Crusher Co.

Pump Valves (See Valves Pump)

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bucyrus-Erie Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Respirators
Pulmosan Safety Equipment Corp.

Rock Drills (See Drills—Rock)

Rod Mills
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Rope (Wire) (See Wire Rope)

Rubbish Burners
Cross Engr. Co.

Rust Protection
Self-Vulcanizing Rubber Co.

Safety Equipment
Pulmosan Safety Equipment Corp.

Sand Separators
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.

Sand-Settling Tanks
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Buffalo Wire Works Co.
Chicago Perforating Co.
*Deister Concentrator Co.
Deister Machine Co.
*Eagle Iron Works
Haiss Mfg. Co., Geo.
Good Roads Machy. Corp.
*Hardinge Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
*Nordberg Mfg. Co.
Productive Equip. Corp.
*Roebling's Sons Co., John A.
*Robins Conveying Belt Co.
Smith Engr. Works
Smith Wire & Iron Works, F. P.
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.
*Wickwire Spencer Steel Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Buffalo Wire Works Co.
*Deister Concentrator Co.
Deister Machine Co.
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Nordberg Mfg. Co.
Productive Equip. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Scrubbers
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
Hetherington & Berner, Inc.
*Link-Belt Co.
McLanahan and Stone Corp.
Sprout, Waldron & Co.

Shovels (Electric, Internal Combustion and Steam)
*Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
*Harnischfeger Corp.
Koehring Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Speed Reduction Units
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
American Manganese Steel Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Stairs (Iron)
Smith Wire & Iron Works, F. P.

Stairs (Mine)
Smith Wire & Iron Works, F. P.

Steel (Alloy)
(See Alloys—Steel)

Steel Grating (See Grating, Steel)

Steel Inclines (See Inclines, Steel)

Steel Plate Construction
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Sprout, Waldron & Co.

Storage Equipment
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tanks
*Hendrick Mfg. Co.
*Link-Belt Co.

Tanks (Sand-Settling)
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thickeners (Slurry)
*Hardinge Co.

Tires (Truck)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.

Tramways (Aerial)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
*Allis-Chalmers Mfg. Co.

Unloaders (Box Car)
*Jeffrey Mfg. Co.
*Link-Belt Co.

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Valves (Pump)
*Taylor Forge & Pipe Works

Vibrating Screen Plate
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagons (Dump)
Koehring Co.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works
*Tyler Co., W. S.

Welding & Cutting Equipment
McLean Welded Products Corp.

Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
McLean Welded Products Corp.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.

Well Drills (See Drills—Well)

Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works

Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Wire & Cable (Electric)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Wire Cloth
Buffalo Wire Works Co.
Ludlow-Saylor Wire Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.
*Wickwire Spencer Steel Co.

Wire Rope
*American Steel & Wire Co.
Buffalo Wire Works Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

Wire-Rope Fittings
*American Steel & Wire Co.
Buffalo Wire Works Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

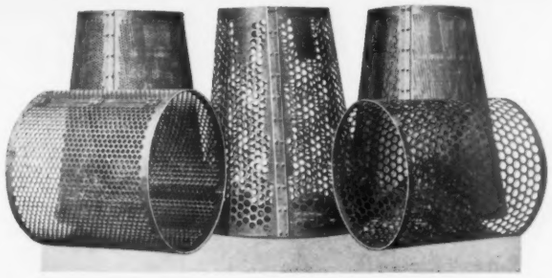
Wire Rope Slings
*American Steel & Wire Co.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

Wire (Welding)
*American Steel & Wire Co.
McLean Welded Products Corp.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.

Worm Gears (See Gears and Pinions)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

CROSS



Perforation for every purpose—Round, Square, Slot, Hexagon Straight rows or staggered

CROSS PERFORATED METAL SCREENS

Cylindrical Screen Sections
Conical Screen Sections
Vibrating Screen Plates
Shaker Screen Plates
Manufactured for all makes of the above type units, or to individual specifications for Sand, Gravel, Stone, Slag, Coal, Coke, Ores, Chemicals, Minerals, Etc.

CROSS Screen Plates give "all the answers" to your sizing problems. Accurately die-perforated from solid one-piece plates of special alloy steel, free from frictional wear of metal on metal, insuring longer service, consistent uniformity and greater capacity.

REDUCE cost per ton by using CROSS Screen Plates.

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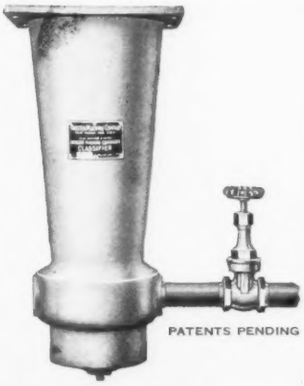
Cylindrical and Conical Screens can be furnished in one section or any number of sections or segments, with butt straps, clips or other fastenings; Vibrating Screen Plates — Plain, Indented or corrugated.

Quality, Price and Delivery Always Dependable

CROSS ENGINEERING COMPANY, Carbondale, Pa.

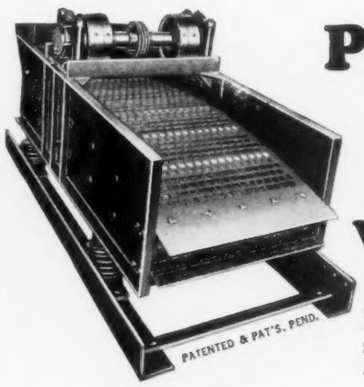
REPRESENTATIVES IN PRINCIPAL CITIES

COMPOUND FUNNEL CLASSIFIER



For sizing minus 5/16" gravel and sand, and for cleaning it by washing out silt and other light impurities.

Descriptive Bulletin No. 23



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Improved Heavy Duty

VIBRATING SCREEN

Built in all standard sizes and in from one to three decks.

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1933 EAST WAYNE STREET FT. WAYNE, IND.

Buy "A Haiss"

BECAUSE it is the most successful, most satisfactory and most profitable—which fact you can confirm from users, and reason out from reading the Haiss catalogs. Four Standard Haiss Loaders—1 to 3 yds. per minute.

Ask for catalogs

George Haiss Manufacturing Co., Inc.

142d St. & Rider Ave., New York, N. Y.

Builders also of HAISS ELEVATORS—SCREENS—CLAMSHELL BUCKETS

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SPIRAL PIPE

Stronger gauge for gauge than any other type. Light weight. Low initial cost. Easy to handle or move. Stout and rigid. Smooth, full-flow interior. Available in steel or Armco Ingot Iron. Write for Catalog.

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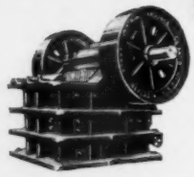
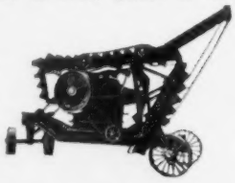
UNIVERSAL CRUSHERS

STATIONARY OR PORTABLE



in any combination with ELEVATORS, SCREENS, CONVEYORS, CRUSHING ROLLS, PULVERIZERS, BINS.
There is a size and a style to meet specifications in every phase of the industry.

Permanent plant operators are finding it profitable to use our portable plants to supplement their present equipment.
Tell us your needs. Our engineers will help solve your problem.
Catalog mailed on request.



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FIGHT DUSTS!

. . . they menace health!

Protect your workers with Pulmosan "M" type Respirators. Get high safety with extreme comfort and easy breathing. Filter out dusts, let in pure air. Try them. Write for Bulletin No. 2, for details.

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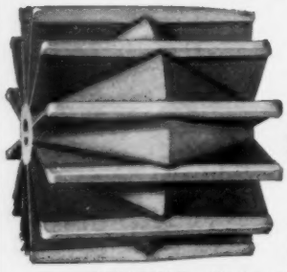
PULMOSAN "M" TYPE DUST RESPIRATORS

SAVE YOUR CONVEYOR

and

Elevator Belts *with* SPROUT-WALDRON Wing Pulleys



Interchangeable with standard pulleys. Nothing can lodge between belt and pulley.

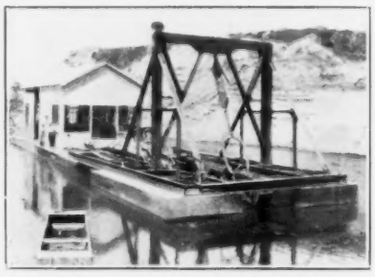
SPROUT, WALDRON & CO. INC.
1221 SHERMAN ST., MUNCY, PA.
Elevating, Conveying and Transmission Equipment

Lewistown Foundry Products
ARE
Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

EAGLE SWINTEK SCREEN NOZZLE LADDER LOWER YOUR COST



Will eliminate stoppages and slug pumping — insuring an even, constant feed of solids to the suction nozzle — with less power — greatly decreasing the cost per yard of material produced.

Write for descriptive literature and let us tell you how this can be done with your dredge.

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Perforated Metals — Screens of All Kinds — For Sand, Gravel, Stone, Etc.

MATERIAL IN STOCK
PROMPT SHIPMENT

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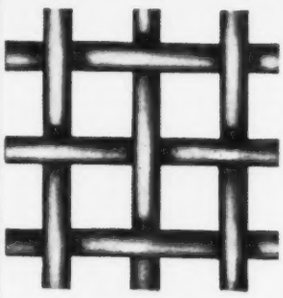
Advertise your wants and surplus equipment in

Pit and Quarry
with which is consolidated
CEMENT-MILL & QUARRY



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Tough and Economical

Made of a special Spring Steel Wire to resist extreme abrasion and withstand severe vibration.

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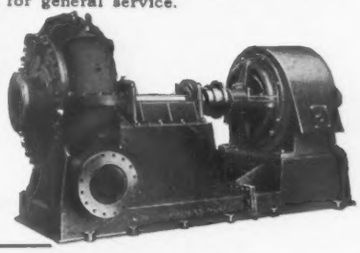
CENTRIFUGAL PUMPS

For hydraulic dredging, filling, sand and gravel production; hydraulic conveying of slurry and other liquids containing abrasive materials; clear water pumps for general service.

Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and for belt, motor, steam, oil or gasoline-engine drive.



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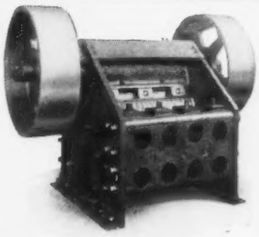
Export Office: 50 Church St., New York.

Good Roads
CHAMPION



Overhead Eccentric Type Roller Bearing Rock Crushers
Elevators Conveyors Feeders Washers Bins Complete Plants

GOOD ROADS MACHINERY CORP.
KENNETT SQUARE, PA.

No Matter How Dirty Your Pit or River Deposits—

The Deister Overstrom Diagonal Deck Sand and Gravel Washing Table efficiently removes coal, sticks, clay, debris and contamination from dirty sand and gravel, producing a premium product. Capacity runs 20 to 45 tons per hour depending on size of material treated. Handles fine sand up to 2" gravel.

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SAUERMAN
LONG RANGE— EXCAVATORS

Sauerman Cableways for wet pits and Sauerman Crescent Scrapers for dry pits and banks have no equals for economy.

SAUERMAN BROS., Inc.
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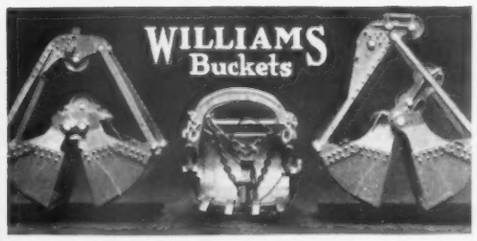
Save Crane Time Per Job



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Hook Williams buckets to your cranes—*now*—and save money per job. Rugged construction assures long service and lowest maintenance cost. *Write for descriptive bulletins.*

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HYDROSEAL DREDGE PUMP

Unique principle of hydrosealing both sides of the impeller against abrasive wear, cuts maintenance to a fraction and saves ⅓ in power costs in pumping sand, gravel, rock and other abrasive materials—Estimated economies guaranteed. Sizes 2" to 22", pulley or motor drive. Descriptive Catalog sent on request

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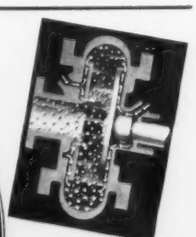

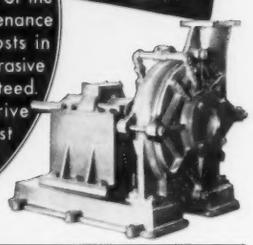

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are popular in the quarry fields. They wear well. Full range of sizes

Heat-Treated
Double-Corrugated Plates

with square, round and "Sqround" perforations. Write for data, particularly on the new "Sqround" Mesh.

Investigate the Weston Testing Screen for making sizing tests.

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PRICED FOR QUICK DISPOSAL

1—MARION Model 21 Steam Shovel on cats. .....$ 650.00
2—24x24 Manganese Roll Crushers, ea. 350.00
1—10x18 Blake Jaw Crusher..... 250.00
1—24" Belt Conveyor, 30' carriage.. 250.00
1—¾ yd. Lorain "55" Gas Shovel, perfect condition 3000.00
1—Sauerman 10 x 12 double drum Steam Skeleton Hoist, Class ES-2, 2-speed drum, perfect condition... 1800.00
1—100-ton Track Scale..... 750.00
24—Koppel 6-yd. Dump cars 36" Gauge Steel Underframe.
21—Flat Cars, 36" Gauge.
3—Porter 18-ton Steam Locomotives, 36" Gauge.
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1—Plymouth 20-ton gasoline Locomotive 36" Gauge.
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1—Telsmith #6 Gyratory Crusher.

See our Show of Contractors and Industrial Equipment, March 7, 8 and 9, 1935

THE W. T. WALSH EQUIPMENT CO.
3088 West 106th Street
CLEVELAND, OHIO

1—50 Ton Cap. Industrial 8-wheel steam loco. crane 90' boom.
1—28-S Smith non-tilting concrete mixer.
1—Late Type Model 42 Barber-Greene loader.
1—½ yd. Northwest shovel & crane 1929.
1—½ yd. Speeder crane late type.
1—Road Pump 500 lbs. pressure latest model.
1—310 cu. ft. Ing.-Rand portable compressor 1931.
1—240 cu. ft. Sullivan portable compressor 1930.
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1—Model 35 P & H Backfiller equal to new.
1—80 H.P. Clyde D.D. gas hoist.
2—60 H.P. American D.D. gas hoists.
1—45 H.P. Clyde D.D. gas hoist.
2—35 H.P. Clyde D.D. gas hoists.
4—20 H.P. Clyde D.D. gas hoists.
4—High pressure Duplex steam pumps.
1—7-S Rex concrete mixer rubber tired wheels.

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1— 170 H.P. 6-cyl. Le Roi.
1— 100 H.P. 4-cyl. Waukesha.
3— 70 H.P. 4-cyl. Waukesha.
3— 50 H.P. 6-cyl. Waukesha.
4— 30 H.P. 4-cyl. Buda.
3—10–15 H.P. 4-cyl. Le Roi.
3— 120 H.P. 4-cyl. Waukesha.
2— 90 H.P. 4-cyl. Waukesha.
2— 60 H.P. 4-cyl. Waukesha.
3— 40 H.P. 4-cyl. Waukesha.
20— 20 H.P. 4-cyl. Waukesha.

STEAM HOISTS

1—10 x12 American 3-Drum without boiler.
2— 9 x10 Clyde 3-Drum with 50 H.P. boilers.
1— 8¼x10 American 2-Drum with 35 H.P. boiler.
3— 7 x10 American 3-Drum with 20 H.P. boilers.

STEAM HAMMERS

3—#1 Vulcan. 1—#2 Vulcan. 1—#3 Vulcan.
2—9B-2 McKiernan-Terry; 1—#7; 1—#6; 1—#5.
2—#400 Vulcan pile extractors.

CRANE RUNWAY

1—60' span 400' long steel crane runway and supports with or without two 5-ton cap. traveling cranes.

Mertes Machinery Company
1622 S. 1st St. Milwaukee, Wis.

We
- Sell
- Buy
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- All Makes
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GREGORY HI-GRADE-REBUILT

Electric Motors, Pumps, Air Compressors Big Bargains. All Standard Makes.

Always Dependable Economical

Money-Back Guarantee

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1603 S. Lincoln St., Chicago

MOTORS— 3 PH., 60 CY.

Hp.	Type	Speed
800	G. E. sl. rg.	720
600	G. E. syn.	860
2–600	G. E. sl. rg.	252
600	G. E. syn.	257
600	Al. Ch. syn.	240
3–675	Al. Ch. syn.	900
400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	720
200	G. E. sl. rg.	1200
200	West. sl. rg.	500
200	F. M. sl. rg.	600
150	G. E. sl. rg.	1750
150	G. E. sq. c.	1750
100	Cr. Wh. syn.	225

ENGINE GENER.
1–400 kva., Cr. Wh., 240 v., 3 ph., 60 cy., 120 r.p.m. to Hamilton Corliss Engine.

MOTOR GENER.
1–750 kw. G. E. MPC., 250 v., D.C. Gener. to 1100 hp. G. E., ATI, synch. motor, 2200-3-60-900 r.p.m.

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3–14,000 G.P.M., 150' Head dir. conn., 675 hp. Al. Ch. 900 r.p.m. syn. motors.
1–14,000 G.P.M., 60' Hd., dir. conn. 260 hp., Al. Ch. 720 r.p.m.

Above are a few of our stock items.

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REBUILT GUARANTEED

LOCOMOTIVE CRANE FOR SALE

1 — 10 TON — 45' BOOM
BROWN HOIST
2 — SAND PUMPS

INDEPENDENT ELECTRIC MCHY. CO.
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A complete sand and gravel plant located on railroad siding with ½ mile of track. Near manufacturing city. New Castle, Pa., district. Equipped with all machinery necessary to operate. Electric Hoist, tipple, pumps, bins, etc. Immediate possession at a real bargain. Address

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BUTLER, PA.

For Sale

1—No. 7½ McCully Crusher.
1—No. 6 Smith Crusher.
1—No. 5 Austin Crusher.
1—10" Superior McCully Crusher.
1—8" Traylor Crusher.
2—No. 3 Gates Crushers.
1—6" Superior McCully Reduction Crusher.
1—48" Symons Horizontal Disc Crusher.
Several Jaw Crushers.
Gas and Electric Motors, 1 HP to 200 HP.
1—Clipper Well Drill.
1—Clyde 2 Drum Hoist, built for 2 Yd. Drag Scraper, with or without motor.
2—Complete Gravel Washing Plants.

LIPPMANN ENGINEERING WORKS
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ALL FINE VALUES

25/30 ton 36" gauge Diesel Locomotive.
3 drum & swinger 60 HP American Gaso. Hoist.
9x10" and 10x12" Steam Hoists, 2 and 3 drums.
50 HP F-M Diesel—Engine or Generator set.
300 HP 3/60/220 Volt Diesel Generator Sets.
20 ton Davenport 36" ga. steam locomotives.
2 Lorain "72" 1¼ Yd. Gaso. Crawler Shovels.
20, 25 & 35 ton Loco. Cranes. Rent or sell.
10, 15 and 20 ton Steel Derricks. Long booms.
Several sizes Sauerman Cableway Excavators.
6' dia. pressure cylinders, 50' and 70' long.

Always a Reliable Source—All Sizes

Diesel, Steam & Electric Equipment, Boilers, Engines, Tanks, Pipe, Cars, Rail, Steel Piling, Shovels, Cranes, Track Scales, Etc.

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FOR SALE

A going Limestone Quarry and plant now operating in Southern Ohio on two railroads. Owners in other business. Will sell at sacrifice. Address **Box 1005, Pit and Quarry Publications, 538 S. Clark St., Chicago.**

Gruendler 3-X-C Swing Hammer Mill 30" Diameter—30" in Width

FOR SALE

An ideal mill for grinding agricultural limestone or can be used as a secondary crusher for producing road stone, chips, etc. SKF roller bearing equipped. In excellent condition. Will sacrifice for one-third of its original cost. Located in Southern Ohio. Address Box No. 1200, Pit and Quarry Publications, 538 S. Clark St., Chicago.

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Monighan Diesel Walker Draglines—6W, 4W, 3W, 2W, & 1½-T. Electrics—½ to 7 yds. Steam—½ to 8 yds. Diesel-Electric Dragline, 3½-4 yds., 115-100' boom. Northwest No. 8, with 60' boom & 2 yd. bucket. A-1. Koehring—1¼-1½ yd., 45' boom. Gas or Electric. 150 HP Sauerman Diesel, with 4 yd. Crescent bucket. Sauerman 1½-2 yd. Any type power; Crescent buckets, 1 yd. Sauerman, belted; Crescent bucket, & blocks. 1 yd. Sauerman—Gas, Electric, or Diesel power.

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SALE OR RENT

One (1) General Crane, 30' boom, #1442.
One (1) Link Belt Crane K-25, 40' boom, #1541.
One (1) Metaweld Compressor, 210' cap'y, rubber tires.
All three machines guaranteed to be in perfect mechanical condition.

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2 Leahy 3x6 double-deck vibrating screens. MAKE BEST OFFER. ADDRESS BOX 203, Pit and Quarry Publications, 538 South Clark St., Chicago.

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SUPERIOR ELECTRIC MACHINERY CO.
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1 No. 5 Austin Gyratory Crusher.
1 40" x 14' Revolving Screen.
1 32" x 12' Revolving Screen.
All in good condition ready for service. Prices Right.

TYGART LIMESTONE CO., LAWTON, KY.

For Sale or Rent

5 to 30-yd. Side Dump Cars.
50-ton Std. Gauge Locomotives.
1-yd. Link-Belt Cranes and Draglines.
1-yd. Northwest Shovel-Draglines.
Also general construction equipment.

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$1,250,000.00 Plant of the Georgia Manganese & Iron Company Entire Plant Purchased New 1930—Operated Less Than Six Months

CRUSHING EQUIPMENT

1—4′ Symons Cone Crusher, Texrope Drive, 100 HP Motor.
1—Set 42″x16″ Allis-Chalmers style B Crushing Rolls, Texrope drive, 2-20 HP motors.
2—4′x10′ Allis-Chalmers Rod-Mills, complete, texrope drives, 50 HP motors.

WASHERS

2—25′ Greenway Patent Hutch Log Washers, speed reducer, 30 HP motor
1—16′ Double Log Washer, speed reducer, 20 HP motor.

VIBRATING SCREENS

12—Traylor Vibrating Screens, 2—48″x 81″, type FB4, 10—42″x72″ Type FB2, complete.

JIGS

5—Sets of 3 each Woodbury Jigs, 48″x 30″, Texrope Drives, 5 HP motors.

TABLES

20—Deister Plat-O Tables, each 5′x14′3″, 3 HP motors.

CLASSIFIERS

2—Dorr Bowl and Rake Classifiers, Type DSDB, 20′ dia. bowls, 6′x33′ long Rake Classifiers, complete.
5—Drag Dewatering Conveyors, 4′ wide, 16′ C/C, each with 3 HP motors.

CONVEYORS

1—Apron Feeder, 60″x5′3″ C/C, Speed Reducer, coupling, 7½ HP motor.

SPECIAL—CAST IRON PIPE

12,000′—24″ Bell & Spigot, consisting of approximately 546 lengths 24″x12′ Class B, 409 lengths 24″x12′ Class A.
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All of this Pipe was purchased new and installed underground six years ago. It is in excellent condition with full complement of fittings and valves; also selection of spare valves and fittings.

1—253 ft. c/c 30 in. Belt Conveyor with Falk reducer, 30 HP AC motor.
1—131 ft. 16 in. Belt Conveyor, with Falk reducer, 7½ HP motor.
1—205 ft. c/c 20 in. Belt Conveyor, with Falk reducer, 15 HP motor.

PUMPS

2—10″ and 2—8″ 3-stage Dayton-Dowd Centrifugal Pumps, each directly connected to 400 HP and 200 HP AC motors.
2—8″x10″ Dayton-Dowd Centrifugal Pumps, Type SLH, 75 HP motors.
1—6″ Dayton-Dowd Centrifugal Pump, size 6-CS, 50 HP motor.
8—6″ 3-stage Dayton-Dowd Centrifugal Pumps, 200 HP motors.
2—4″ Type CS Dayton-Dowd Centrifugal Pumps, 40 HP motors.
4—Wilfley Centrifugal Pumps, 3″x11″, model C, 20 HP motors.

All of the above motors are AC equipped with semi-automatic starters, time element over-load and time element undervoltage protection.

ORE CARS

10—Steel Ore Cars, 100,000# capacity, standard Gauge.
1—30-ton Plymouth Gasoline Locomotive, standard gauge.
1—20-ton 30′ span and 1—10-ton 24′ span Shepard Niles Traveling Cranes.
1—Fairbanks-Morse Track Scale, capacity 200,000#.
1—48′ centers, 14″ steel enclosed Bucket Elevator, 15 HP motor.
1—Portable Class 220 8″x6″ Gardner-Denver Gasoline Compressor.
4—400 KVA Westinghouse Transformers.
10—150 HP and 2—100 HP GE Slip Ring motors, 3/60/2200 V, 865 RPM.
1—Thew Gasoline Crawler Shovel, 1 yd.

Miscellaneous: 25,000# Copper Cable, Drill Press, Tool Grinder, Pipe Machine, Steel Pipe, Electrical Fittings, Valves, Poles, Transmission Hardware, Miscellaneous Supplies.

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New York Office: 15 Park Row

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Representative on Premises—Visit the Plant.

FOR SALE

1—12′ Gayco Separator, model 21.
3—Hardinge Mills, 4½′x16″, 5′x22″, 8′x30″.
3—Jaw Crushers 10x7″, 24x12″, 30x60″.
2—Sturtevant No. 1, No. 1½ Rotary Fine Crushers.
1—Sturtevant No. 1 Ring Roll Mill.
4—Gates Gyratory Crushers No. 3D, No. 6D.
5—Traylor Crushing Rolls, 42x18″, 36x16″.
3—Raymond Mills, two roll, four roll, five roll.
6—No. 0000, No. 00, No. 1 Raymond Mills.
2—Rod Mills 5x10′, 4x10′.
2—12″ Traylor Bulldog Gyratory Crushers.
1—Symons 7′ Cone Crusher.
4—Tyler, Sturtevant Vibrating Screens, single and double units.
6—Hammer Mills, Jeffrey, Williams, Sturtevant.

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STEIN-BRILL CORPORATION
183 Varick St., New York City, N. Y.

FOR SALE

Farrell 18x36 type B Jaw Crusher.
Acme 12x22 Jaw Crusher.
Reliance 8x14 Crusher, fine crushing.
Sauerman Steel Mast, 1-yd. Slackline Bucket.
Belt Conveyor, 24″ trough and 90′ long.
Belt Conveyor, 20″ trough and 130′ long.
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Elevator, 76′ high, 30″ buckets on 32″ belt.
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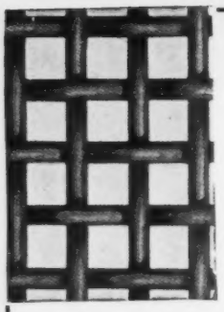

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"NAT-ALOY"

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Withstands vibration without crystallization.
Super-tough to resist abrasion.
Maintains accuracy throughout life of screen.
Has outworn other special alloy cloths.

Stock shipments—Attractive prices

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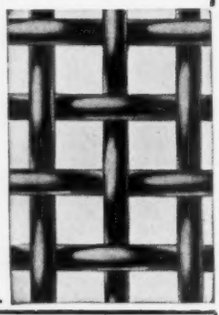

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FOOT OF BELLE STREET **ST. PAUL, MINN.**

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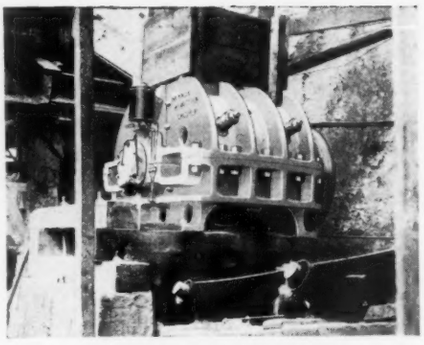

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AS builders of crushing machinery since 1891, Bonnot engineers are proud to offer this proven product of experience—the Bonnot Reduction Crusher. It sets new standards in the production of uniform quality materials, delivering a higher percentage of finished product, free of slabs, fines and oversize, averaging 85% against 75% for ordinary jaw type crushers. The slow creep mantle feature insures an even distribution of wear over the entire crushing area, resulting in longer service life and lower maintenance costs. This crusher has made a big name for itself throughout the mineral industries, because of these advantages:—

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5. Minimum choking
6. Extra long life
7. Lowest upkeep costs
8. Safety plus
9. Big quality tonnage
10. Real power savings

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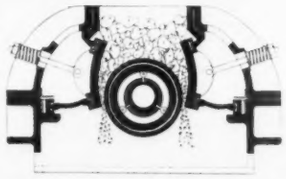

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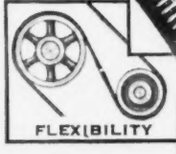
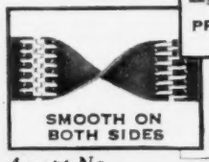
STEEL BELT LACING





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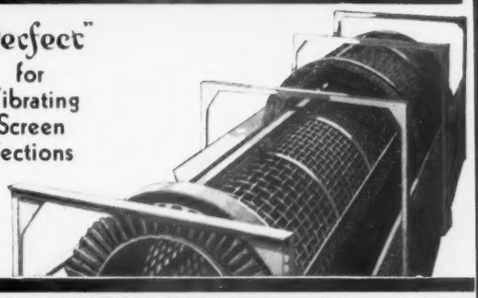
"Perfect" for Vibrating Screen Sections



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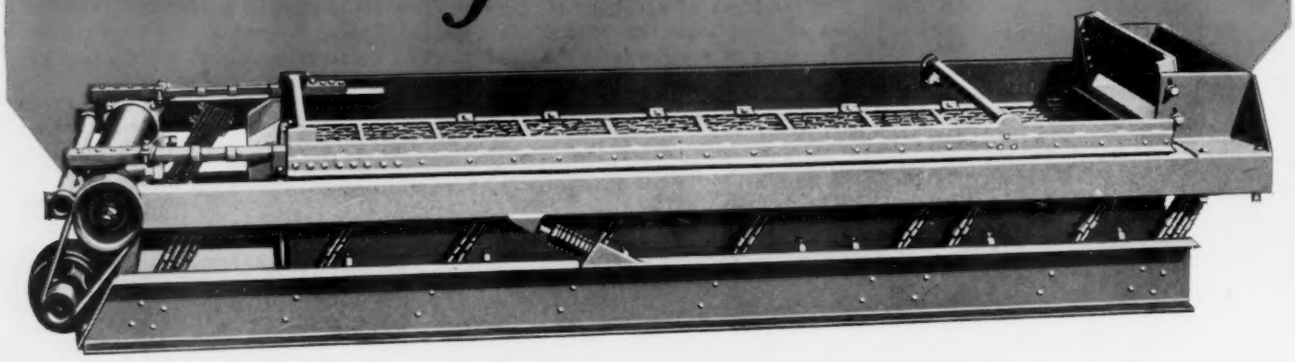
The SYMONS *for* *Uniformly Screened Sizes*



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With the growing demand for better graded materials and with specifications becoming more and more rigid, it is essential that your screening equipment meet these newer trends. With a screening action that is different, Symons Screens give you uniformly graded sizes to meet present day requirements.

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